



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

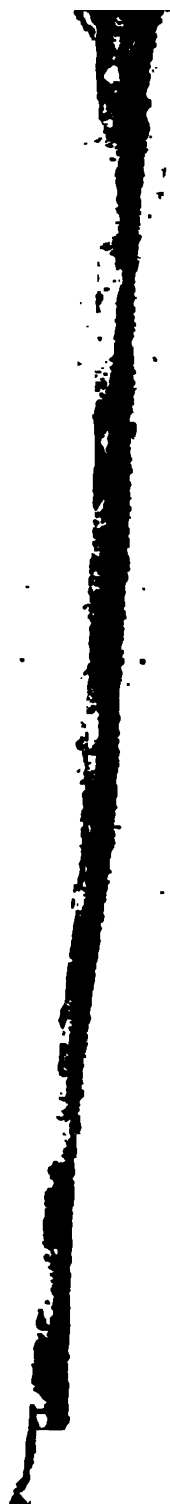
- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>













BATH SOCIETY PAPERS, &c.

On BEANS.

[*By Mr. SARGENT, of Grittleton, Wilts.*]

ON the 12th of March last I received two quarts of a new kind of small horse-beans, sent from Holland.—The spot I fixed on to plant them in was part of a very large field intended for turnips, and measured nearly 45 perches. As it was very long and narrow, the soil varied greatly, one end being a heavy sand, apt to run together and bind, when much rain suddenly follows the time of working it. The other end I am quite at a loss to name, it being a rude compound of clay and rugged stones, whose surface for roughness resembles a cinder, and greatly obstructs the point of the share in ploughing. In general this land is very wet, but this season so dry, that it was ploughed with great difficulty; and this part only had a small quantity of dung in consideration of its extreme poverty.

The beans were planted on the 17th, with the chain in rows three links and a half distant, and two links from bean

to bean in the rows; for they were planted singly, so that a space of seven square links, or three square feet were allotted to each bean.—When about six inches high, they were hoed, and earthed up a little, but in a very bad manner, the ground being rough and hard, which rendered the work very tedious.—The weeds grew amazingly, but notwithstanding they possessed so large a share of the ground, the beans were in general five feet high, having from 20 to 70 pods on a stalk. I counted the number from one single bean, and found them to be 114, which, allowing on an average three beans and a half to a pod, is 399.—They were housed on the 4th of September, and when threshed yielded thirty-five gallons Winchester measure, weighing 296lb. nett.—*Oct. 1779.*

[*By the Rev. Mr. CLOSE, of Hordle.*]

Of early Mazagan beans I never grew more than seven quarters per acre; of tick I have had eleven, but the former are fit for harvesting three weeks before the tick beans, and give me more time to prepare the land for wheat. I always arrange my pea and bean crops so as to succeed each other, that I may have time to harvest the crops, and till the lands, without much additional force. This is my rotation—early hotspur pea, an early grey pea, the Spanish dwarf, the Marlborough dun, the Mazagan bean, and the tick bean. They come to harvest in the above order.—*March 1799.*

[*By Mr. PAVIER, Monckton.*]

A farmer sowed a few early pease in drills two feet distant from each other, and the produce was equal to six hundred pecks of green pease per acre.

On BUCK WHEAT.

[*By Mr. BARTLEY.*]

A PIECE of sandy land at Brisslington of seven acres, after being cleansed from brambles and furze, once ploughed and rolled, was, on the 9th of June 1780, sown with buck-wheat, two bushels and a half to an acre. The crop suffered much by wet and birds, but 24 Winchester bushels of seed were saved per acre, and the land was brought into tillage for wheat.—For feeding hogs, I esteem this grain equal to barley; it is much more easily and conveniently ground than barley, as a malt-mill will grind it completely. Horses are very fond of the grain, and poultry of all sorts are speedily fattened by it.—The blossom of the plant affords food for bees at a very opportune season of the year, when the meadows and trees are mostly stripped of their flowers.—The English term *buck-wheat* seems to be a corruption. I am rather inclined to think it ought to be *beech-wheat*, from its likeness in shape and colour to the beech-mast, also from its classical name *fagopyrum*. I have likewise seen it termed beech-wheat, in an English treatise on husbandry, written in the reign of Henry VIII.—*Feb. 1785.*

In another letter, Mr. Bartley says:—The most proper time for sowing it, I find to be from the middle of May to the middle of June. I would choose rather to sow it even in the beginning of July than before the middle of May; for it is very impatient of cold in its first vegetation.

A crop of buck-wheat is, in my opinion, so much clear gain to the farmer, seeing that the land is thereby so well-prepared for a succeeding crop, even better than by a fallow; besides that it affords a noble resource for raising manure.

[ANONYMOUS.]

Buck-wheat is esteemed in Suffolk, Norfolk, and Essex, as adapted to lands of about 5s. value per acre; or from 3s. to 10s.; but can never answer on deep friable loam worth 1l. 1s. per acre; for on the *latter* there will always be too much straw, even without manure; and the *former* will yield on an average from three to four quarters per acre. It prevents the growth of weeds, but will not destroy couch-grass. It is usually sown in Suffolk with grass-seeds for laying down land, and for that purpose it is preferred to most other kinds of spring corn.

On CABBAGE, and its Varieties.

[By Dr. ANDERSON.]

THERE are two kinds of cabbages very obviously distinguishable from each other, the *red* and the *white*. It is well known, that if either of these kinds be cultivated in a district where none of the other is raised, no plants but of that kind will ever be obtained from the seeds there produced. No person who inhabits a part of the country where red cabbages are never brought to seed, ever saw a red cabbage plant raised from seeds of his own saving, nor the reverse. But it is also a fact equally well known, that if both white and red cabbages are reared in the same district, it is impossible, without very great precautions indeed, to keep the two kinds distinct, if an attempt be made to rear them from seeds of their own saving. The plants raised from seeds of the white cabbages become in this case, if nearly an equal proportion of each be saved, tinged with red veins, and those of the red become in some degree white; so that nothing but a mongrel breed, neither true red nor true white, can be obtained.

[ANONYMOUS.]

Turnip-rooted cabbage will produce from twenty-five to thirty tons per acre; and for *spring-feed* are certainly the most valuable crop in the whole circle of husbandry. They are invulnerable to frost, either in or out of the ground.—Scotch cabbages, if they be the true flat-topped firm kind, are never affected by frost, a few of the outside leaves excepted. On land not worth more than twelve shillings per acre, I have had fifty-four tons per acre. An ox will in common eat about two hundred pounds in twenty-four hours. A sheep of twenty pounds a quarter will eat fifteen pounds of Scotch cabbages in twenty-four hours.—When cows and oxen are fed with cabbages, their dung is more in proportion than when fed with turnips, which go off more in urine; or than with hay, which is of too dry a substance.—*March 1781.*

[By Sir THOMAS BREVOR.]

The first or second week in June, I sowed the same quantity of seed, (turnip-rooted cabbage) hoe the plants at the same size, leave them at the same distance from each other, and treat them in all respects like the common turnip. By this method I have always obtained a plentiful crop; to ascertain the value of which, I need only inform you, that on the 23d of April last, having then two acres left of my crop, sound, and in great perfection, I divided them by fold-hurdles into three parts of nearly equal dimensions. Into the first part I put twenty-four small bullocks of about thirty stone weight each (14lb. to the stone) and thirty middle-sized fat wethers, which, at the end of the first week, after they had eaten down the greater part of the leaves, and some part of the roots, I shifted into the second division, and then put seventy lean sheep into what was left of the first; these fed off the re-

mairder of the turnips left by the fat stock; and so they were shifted through the three divisions, the lean stock following the fat, until the whole was consumed.—*Sept.* 1784.

In another letter, dated May 1, 1786, Sir Thomas says, “My turnip-rooted cabbages are now in high perfection. I have about three acres left, with which I am feeding twenty-two bullocks intended for fattening this summer; seventeen cows, two bulls, four young cattle, and one hundred and ten sheep, besides thirty horses, which partake largely of them. In order to ascertain in some degree the quantity of food they produced, I carefully selected some of them, and some of the common turnips; and having girted each of them with as much accuracy as possible, I found the turnip-rooted cabbage of the circumference of 18 inches weighed 5½lb. and the common turnip of the same circumference 3½lb. only. Their late continuance for a green and most nourishing food is indisputably a merit they must be allowed, beyond any other known vegetable production.”

And again:—“The following is an account of the cattle or beasts fed from five acres of turnip-rooted cabbages; four acres of which were eaten upon the land as they were growing, (but parted off by fold-hurdles into portions of about an acre each) and one acre pulled up and carried to the stables and ox-houses.

£. s. d.

Twelve Scotch bullocks, weight 40st. each 4			
weeks, at 2s. per head per week	-	-	4 16 0
Eight homebreds, 2 years old, at 1s. ditto	-	-	1 12 0
Fifteen cows full-sized, at 2s. per week	-	-	6 0 0
Forty sheep, at 3d. ditto	-	-	2 0 0
Eighteen horses, fed in the stables with an al-			
lowance of hay, at 1s. ditto	-	-	3 12 0

£. 18 0 0

"Besides 40 store hogs and pigs, which lived upon the broken pieces and offal, without any other allowance for the whole four weeks."—*June 1787.*

On the 30th of May 1788, I had four acres of turnip-rooted cabbages sown in the random or common method of turnip sowing, which, growing very thriftily, were hoed out the first time on the 1st of August following, and again a second time on the 16th. These plants endured the long and severe frost of the succeeding winter without the least injury, though three-fourths of all the common turnips in this county were destroyed by it.

"In consequence of the very cold weather we have had here, the grass is but just springing, May 3, 1790; which, as the turnips are wholly eaten up, occasions much distress amongst the farmers, for want of some green vegetable food for their sheep and cattle; whereas, by the assistance of my turnip-rooted cabbages, (at which I have now two hundred sheep, and seventy neat beasts, besides many that are given to horses and pigs) I have an abundance of the best and most nutritive food that can be found them; and which will continue in perfection for a week or two longer, or more, if they should be wanted."

[*By Mr. VAGG, Chilcompton.*]

I send, agreeable to request, some account of my cabbage crop, of twelve acres. I weighed the produce of one perch, on each side of the road; there being some considerable difference in the appearance of the two pieces. The perch on that part which appeared lightest, weighed five hundred and one quarter; and sixty times that weight, I believe, makes forty-two tons per acre. The perch on the other side weighed eight hundred and a half, which is sixty-eight tons per acre. This difference I account for from the first having

been sown in the beginning of March, and therefore had not so good a chance for growth as the others, which were sown in the autumn, and planted out in May.—*Dec.* 1787.

[*By the Rev. Mr. BROUGHTON, Twerton.*]

The turnip-cabbage is different from the turnip-rooted cabbage, and so distinguished by Mawe. It is a hardy plant and a valuable acquisition to the kitchen-garden. The best season for sowing for the garden appears to me to be the end of May, or beginning of June. With respect to the management of the plants, they require nearly the same treatment as brocoli, in regard to transplanting, distance, &c. They are usually most esteemed when young, and about the size of a moderate garden turnip; those sown in June will continue good all the winter. The bulb must be stripped very clean of its thick fibrous rind; after which it may be treated as a turnip. The sprout is very good, especially in the spring, when they begin to run.—*Mar.* 1790.

Mr. Broughton also wrote some other letters on the same plant. “On the 2d of December I caused three square lug to be cut in three different parts of a piece of land about three acres, and found the weight to be as follows:

No. I. One square lug, ridges somewhat more lbs.
than three feet, plants three feet in the rows, seed
sown middle of March, weight - - - - - 230

No. II. One square lug, ridges barely three feet,
plants three feet in rows, seed sown beginning of
April, weight - - - - - 260

No. III. One square lug, ridges about two feet,
plants three feet in rows, seed sown end of April,
weight - - - - - 260

"The inferiority of No. 1. was not, I believe, owing to early sowing, but more of that plantation than most of the others, and no opportunity offering to replace them for nearly six weeks, the plants in the food-bed were stunted in their growth by the drought, and never thrived well afterwards. Upon the whole of my experience, I recommend this plant very earnestly to the attention of farmers; and am much mistaken, if it will not be found, under proper management, to be one of the best hitherto cultivated, especially as a *late spring food*.—*Dec. 1793.*"

[By Sir THOMAS BEVOR.]

Some of the mowing cabbages were cut down three times, and grew into head again so speedily, that had I had leisure to have attended to them, I doubt not but that the cuttings might have been repeated; but as there is never on my farm any want of fresh vegetable food for cattle in the summer, unless I can find them continue to vegetate in like manner during the winter (which mine have not) or very early in the spring, I think they will not prove to me, or any one under the like circumstances, an object of much value.

The few mowing cabbages which I have reserved for feed, abound in the most vigorous leaves, which, if after having been eaten down by sheep or cattle, they would sprout again as freely and frequently as after they have been mown down, and would certainly prove a most profitable crop; but this, I believe, is yet to be tried — *May 1790.*

In another letter, dated Jan. 7, 1792, in answer to a Query he says, that this plant did not shoot again so as to be worth preserving after being fed down by sheep.

Q. Are not turnip-rooted cabbages a much longer time before they are fit to be hoed than turnips?—*Mr. Le Blanc.*

A. Yes, three weeks or a month.—*Sir Thomas Bevor.*

Q. Is not the hoeing consequently the more difficult and expensive, as the weeds have the greater advantage over them?

A. In a wet season the hoeing is certainly more difficult; on a clean fallow, and in a dry season, very little more; and I have never paid more for hoeing them, than for common turnips.

Q. The colour of the plant being darker than that of a turnip, and more difficult to distinguish from the charlock, which generally abounds in turnip-fallows, particularly the most early sown, is it not another reason why the hoeing should be more difficult and expensive?

A. My workmen say, they can easily distinguish them from charlocks; and have never yet charged me more for them.

Q. How many times are they hoed, and at what price?

A. This must depend partly on the season; they are generally twice hoed, 4s. for the first, and 2s. for the second.

Q. Has it ever been observed, that the hardness of the root affects the sheep's teeth; that objection having been made to them by shepherds?

A. Not keeping any breeding sheep, but only wethers, which are sold fat after having fed on them in the latter part of the spring of one season, or two at the most; I have never observed the mischief charged to them.

Q. Is there any difficulty in making the sheep eat them up clean?

A. I have not observed any, by making a lean stock follow the fat; but if there be, hogs will greedily eat up all the pieces, and thrive greatly upon them.

[By Mr. L. TUGWELL, of Leighton.]

Although facts would always speak for themselves, and the turnip-rooted cabbage, properly treated, has always been found competent to every necessary purpose; yet, too

true it is, that hitherto it has been mostly considered as an off-scouring article—a matter to be attended to only when nothing else can be found for employment.

There are many reasons that should direct a sheep-master, on an improved upland tillage farm, to leave even his fine field of hay for an opportunity of putting in seasonably his turnip-rooted cabbage.

His increased crops of hay, grass, vetches, turnips, &c. enabling him to sustain, at all other times, through the year, an enlarged stock of animals, not only procured with great care and expence, but whose frames having also been greatly extended from an ample supply of these edibles, will become the more susceptible of injury from a temporary discontinuance of them. Being driven to the pinch, rather than sustain such injury, (from a temporary scarcity of probably not more than six weeks from about the middle of April to the latter end of May, and which is generally experienced once in four or five years, and of late more frequently) he will feed down his natural grasses, otherwise allotted for the scythe only; rather than depreciate a stock he may have been some years raising to an high pitch of excellence, he will turn them in on his clovers, ray, and other artificial grasses, all procured at great expence; but which, on difficult upland farms, should a dry season succeed, even in the partial degree often experienced, will be of comparatively little value. Whereby not only the quantity of summer food in grass, necessary to the maintenance of an appropriated stock, but that also intended as hay for their winter support, will be greatly depreciated and lessened; while his wheat after clover, and barley after turnips, will both be involved in the consequences, and in a similar proportion be disparaged and lessened also. During such distress, he will not deem even his now growing fine field of

early-sown wheat as sacred and unapproachable ; although he knows that, on shallow soils, nothing can be more injurious than feeding it in the early spring months.

To attempt investigating the causes why the turnip-rooted cabbage has not, in our present improved systems of culture, made a further progress, would be entering on a field too large for this memoir.—Those *usually urged* are, first, That the toughness of its coat occasions, to sheep fed on it, a premature loss of their teeth ;—fortunately, against this, assertion only can be brought, The writer, during more than twenty years uninterrupted experience, wherein he annually fed from 3 to 700 sheep, does not recollect more than one instance where he believes the loss of a tooth was fairly imputable thereto.—Secondly, It has been said, that its fanged roots, carrying much dirt, are found difficult to be consumed, and are frequently left an incumbrance on the soil ; this, among many others, is a proof of how little knowledge of the specific and valuable properties of this plant has hitherto been acquired. It is generally known, where the plant has been cultivated, that its roots are fanged and numerous ; while few, it seems, are aware, that these fangs are equally sweet and nutritious with the bulb itself.

After experiencing for awhile many disasters, the writer, early in life, set himself earnestly about discovering that great desideratum—a spring-feed for sheep : and after trying every plant that appeared to stand forward for pre-eminence in the case, viz. Scotch Drum-head cabbage, large Red cabbage, American Sugar-loaf cabbage, *Turnip cabbage*, Borecole, Black-Brocoli, Choux-de-Milan, &c. &c. found them all appropriately useful ; but neither, in any wise, to come in competition with the turnip-rooted cabbage, for a permanent and stable support for sheep in severe seasons and critical situations, when and where *no other* virid food can be relied

on; and even that expensive article hay will frequently, in dry weather, become disgusting to them.

In taste and consistence much resembling the kernel of a cocoa-nut, their juices are more oily and less succulent than those of any other root employed for agricultural purposes; and are, probably, in a similar degree more nutritive than any. They not only *in this* appear appropriate to the particular season, but, if given to sheep *soon* in the winter, will be found *comparatively useless, frequently injurious, and sometimes deleterious*. While a few warm days will, early in the spring, set the juices of all other vegetables in motion, as preparatory *only to future* supplies, those of the turnip-rooted cabbage, retaining their original Lapland habits, remain invincibly dormant, motionless, as it were, reserved for our intervening use and relief. About the middle of April (sooner or later, however, as the spring may be more or less forward) they begin to vegetate, and the foliage on the tops of their bulbs to put on a sort of bushy appearance, and which alone implies their becoming wholesome and nutritive.

If at this time sheep are introduced to them *without* pulling them up, and splitting them through the middle, (which, by the way, ought never to be done) they enter with their teeth on its bulb near the top, and scooping downwards within its ligneous tunic, soon form a calyx or cup, containing, according to the size of the bulb, half a pint, more or less; and which the sap, *at its critical period* suddenly and actively rising, will fill to the top, and frequently flowing over, will run down the sides of the ridge to the length of 12 or 20 inches: or if, not being allowed more than a sufficiency, the sheep devour its flesh, tunic and all, below the surface, and afterwards by their trappings cover up with dust the remaining part of it; the same disposition prevailing therein will send up the juices through such dust, flowing in

like manner to a considerable distance. At this time, also, the tunic or skin will be found easily separated from the flesh, or internal part of the bulb; as from the same cause, *i. e.* the ascent of the sap, will the bark be separated from the tree it has covered. If without regarding these intimations sheep are brought on them sooner in the season, and cold and wet weather should ensue, while they consume a fourfold quantity more than they otherwise would, they will frequently be affected with a sort of white flux; their fæces coming away in a fluid state, and with a white and very singular appearance; while the animals themselves appear wretched and greatly distressed, and their flesh to be daily falling away. In this case, they are to be immediately removed, and other food given them, (where it may be found) and they will recover without further harm; and when the proper season arrives, as above described, they may again be introduced to these roots without danger of their being again so affected.

As a proof of the permanent, warm, and nutritive qualities of this plant, used in *its proper season as above described*, if hay be given to sheep feeding thereon, and while they are allowed their fill of the roots, it may be observed, they will for the most part reject it; or, however, take only a little, as it were to change their palates.

Finally, as a confirmation of the whole of these recommendatory narratives, the writer, during 20 years practice, found the produce of an acre of these roots, uniformly, and on an average, adequate to the support of seventy sheep during four weeks of the most hungry, the most trying, and most critical season in the year.

From trials made on fertile or certain local soils, favourable in their genius to the growth of this vegetable, it has been announced in several publications, that the expence of transplanting it from a seed-bed may be saved; and that its seeds,

committed by the broad-cast method of culture, will succeed quite as well. These directions *very unfortunately* involving a two-fold species of error, have induced many, through a mistaken parsimony, to adopt the mode; and having therein altogether failed, they have set aside the plant, as totally useless, and undeserving of further trial. The writer of this (superintending himself the operation) has frequently had the plants removed from the seed-bed, and set growing in the field, at the expence of 2s. or 2s. 6d. an acre, and afterwards let the hoeing, the ridges only, at 3s. more; which together is the customary price giving for hoeing an acre of turnips; and with regard to the additional culture given by the plough, not including the benefit derived to the incumbent crop, its expence may very impartially, and with great propriety, be posted to the account of the subsequent barley crop, as a better fallow for the purpose cannot be given.

A spirited trial accordingly took place in Scotland; and in a volume of the Transactions is given the following account of it: "We made a fair trial of the turnip-rooted cabbage at Cullen-House last year; they succeeded beyond expectation, and there are as many seeds of them preserved this season as would sow a whole country. I cannot entertain a doubt of their supplying the want of spring food after the turnips are exhausted. The sheep eat them greedily, preferring them to every other sort of food. The roots in general weighed from 8 to 10lbs.; a few of them more."

The seed should be sown on a spot set apart for the purpose, clean and well manured, about the middle of April. Half a pound of seed may be sown on a space of ground ten yards one way and nine the other. As the plants rise, the fly must sedulously, and may *here easily*, be attended to; and if their depredations are discovered, let wood-ashes or foot-be slightly, however immediately, strewed over the bed, the

operator walking on the windward side; and repeated if necessary. If before Midsummer, the time for removing the plants to the field, they are observed to advance too fast in their growth, or their stems, from weeds having arisen among them, or any other cause, are drawing out to an improper length, and as thereby they might in a degree lose a proper shape never to be regained, they may, in either or both cases, be prevented by the following method:—Begin drawing them clean up on one side of the bed, and turning the earth over whereon they stood four or five inches deep with a spade, lay them along the trench forty or fifty in every yard: their roots being then covered with the earth of the next spit, must be gently trodden down, and the digging continued until another trench be formed, about twenty inches from the first, to be supplied in like manner with plants, the next at hand from the feed-bed; and thus regularly proceeding, all must be removed that require it. This checks their growth, and renders them less liable to injury when removed to the field. The plot, intended for their reception at Midsummer, ought to lie in the most fertile part of the turnip-field, but by no means on a clay soil; as, although they may be better able to contend with its tenacity than the common turnip, should wet weather come at the time of their being consumed, it will be found very inconvenient in the feeding them on the spot, and the land in all probability, would be thrown out of its season for barley; while to haul them away, if the soil should be at all poachy, would be still more troublesome. The reason for giving it the best part of the field, is under the view of making the less land suffice for the purpose; as the subsequent barley-sowing must necessarily be retarded longer than might otherwise be thought eligible. The plot determined on ought to be well fallowed and pulverized, and eight waggon, or a proportionate num-

ber of cart-loads of dung or compost dragged in on an acre. It must then, and immediately, be thrown into one-about ridges with the common plough, unless the double-mould-board one may be obtained, which would be by far better. At Midsummer let the plants be carefully planted at the distance of two feet from each other.

At the end of about a fortnight (more or less) after planting, the ridges will require hand-hoeing, and the plants thereby to be a little dressed. Soon after this, let the common plough pass twice along each interval; and if the land be clean, and not too compact and close, turn a furrow toward each row, taking care not to bury the plants; if otherwise, the furrows must be turned from the rows, and a ridge be formed thereby in the middle of each interval, bringing the plough for the purpose within about three inches of the plants. This ridge must, within a fortnight or three weeks, in dry weather preferably, be returned again to the rows, and soon after be given another hand-hoeing.

The time proper for feeding being arrived, (about the middle of April, sooner or later, and indicated by the tops of the plants, after having lain dormant awhile, putting on a bushy appearance, as before described) the sheep are to be introduced to them, as to common turnips, with hurdles, &c. and the roots to be preparatorily pulled up with a light mattack-like hook, having a claw on one side of about nine inches length, with a transverse edge at its end of about two inches width, and on the other a kind of a hatchet, or more properly cleaver; with this the roots may be taken up with ease, its handle, of about three feet and a half in length, acting as a lever for the purpose. When the root is up, it receives a stroke or two with the side of the implement, by which its fangs are in a degree divested of their dirt; and another with the hatchet, or cleaver, on its back, which di-

vides it in two; by such division the sheep's teeth being introduced to the centre of the bulb, they work their way outward to the shell, and thus, with great facility, devour the whole, or nearly, shell, fangs, and all.—*May 1799.*

[*By Mr. ROBINS, Bold-Down, Gloucestershire.*]

The best method I have yet discovered to raise the plants of the turnip-rooted cabbage, is to breast-plough, and turn as much old pasture as may be judged necessary for the seed-bed; two perch well stocked with plants, will be sufficient to plant an acre. The land should be dug as shallow as possible, turning the ashes in; and the seed should be sown the beginning of April. The land intended for the plantation should be cultivated and dunged as for the common turnip. About Midsummer, (or sooner if the weather will permit) will be proper time for planting.

N. B. If the young plants in the seed-bed should be attacked by the fly, sow wood-ashes over them when the dew is on, which will effectually prevent the ravages they would otherwise make.

I have tried different systems of agriculture, and found the following method best adapted to our poor lands. It is what we call a *six-field system*:—1st year, Turnips; 2d year, Barley, with grass seeds; 3d year, Grass; 4th year, Feed; 5th year, Wheat; 6th year, Oats; after which, Turnips.

[*By Dr. PARRY, Dec. 1786.*]

Particulars of a crop of winter cabbages, on three acres of land, part of a farm of fifty acres; value of land about 12s. per acre.—Eight rows of cabbages, in number 381, weighed 6915½lb.—Total number of cabbages on the three acres, 12,170.—Total weight of the cabbages, 98 ton, 12 cwt. Weight per acre, 32 tons, 17 cwt. and somewhat more.

On CARROTS.[*By J. BILLINGSLEY, esq.*]

TWO perch dug in different parts of the field, neither the best nor worst, produced, one 114lb. the other 104lb. Average 109lb. or 7 tons, 15 cwt. per acre, which, at only 20s. per ton, amounts to 7l. 15s.—Expences 2l. 7s.

CABBAGES.—One row cut from end to end of the field, weighed 32 cwt. or per acre 36 tons, which, at 4s. 6d. per ton, amounts to 7l. 4s.—Expences 3l. 13s.

Again, in another letter this gentleman says, “ The field in which my carrots were raised was a few years ago part of the forest of Mendip. It contains eight acres: the soil a gravelly loam, of a good depth. In the year 1776, it received an ample manuring with lime, (about twenty quarters per acre) and was sown with turnips; in 1777, with barley; in 1778, it was again manured with horse-dung, to the amount of fifteen cart-loads per acre, and planted with the large Scotch cabbage. The produce of this crop was very great, being more than thirty tons per acre, and the stock I maintained with them would astonish the farmer unaccustomed to the cultivation of this plant. And here I cannot forbear recommending, in the warmest manner, the culture of this cabbage (in conjunction with turnips) to every spirited Agriculturist, and particularly to those who keep large flocks of sheep. Every person in that branch of farming must have frequently experienced, during severe frost, and deep-snow, great difficulty at getting at his turnips. Now this inconvenience would entirely be obviated by his possessing three or four acres of this plant; for their height and hardness render them accessible and found at all

times, and in the most severe seasons. I will not say that the produce will be equal in weight to a well-managed crop of turnips, but will be bold to affirm, that one hundred pounds of Scotch cabbage will go as far, in keeping or fattening horned cattle, as one hundred and fifty pounds weight of turnips. But to return: In the spring 1779, I began preparing for my carrot crop. Particulars as follows:

	£.	s.	d.
Feb. 15. First ploughing across the ridges of the cabbages, 4s. per acre	1	12	0
March 1. First harrowing, 9d. per acre	0	6	0
April 15. Second ploughing, 4s. per acre	1	12	0
20. Second (bush) harrowing, 9d. per acre 30lb. red Sandwich carrot seed, at 1s. per pound	0	6	0
April 24. Sowing by hand in drills, one foot apart, and covering the seed, 13s. per acre	5	4	0
June 4. Hand-hoeing and thinning, 20s.	8	0	0
October. Digging up, 30s. ...	12	0	0
Carting home, cutting tops, and securing	10	0	0
Rent of land	8	0	0

48 10 0

The produce was 640 sacks, of 4 bushels each,
valued at 3s. per sack 96 0 0

Each sack weighed upwards of 200 pounds

Nett profit of the crop £.47 10 0

Nearly 6l. per acre.—Quantity of carrots, 8 tons per acre.

“ From experiments which I have made, I am fully persuaded that carrots are worth more than 3s. per sack, in fattening hogs.”

This letter concludes with a proof of the inefficacy of burning when applied to the soil of Mendip.—*Nov.* 1781.

[ANONYMOUS.]

Sowing and covering carrot seed in drills, from two trials only which I have made of it, appears to me not so eligible as sowing the seed broadcast. The two drilled crops were with me the worst I ever grew. The seed of carrots, although ever so well rubbed with sand or any other substance, will still adhere together to that degree, as to render the delivery of it in drills both tedious and uncertain; and where-ever it falls in patches, the loss of ground is considerable.

[By Mr. ARTHUR YOUNG.]

It appears from *Norden's Surveyor's Dialogue*, published in 1600, that carrots were commonly cultivated at that time about Orford in Suffolk, and about Norwich in Norfolk; and it is very remarkable, that the tract of sand between Orford, Woodbridge, and Saxmundham, has, I apprehend, to this day, more carrots in it than all the rest of the kingdom put together; a striking instance of the locality of practices in agriculture, and of that extreme tardiness with which any particular branch of cultivation moves from one place to another.

In the summer of 1779, one farmer had 36 acres, many of them from 10 to 20, few less than 5 or 6, and scarcely one that was without any. The strait, handsome, clean roots are sold at 6d. a bushel to London; and all the rest used upon the farm, chiefly for feeding the teams of horses, at an allowance of a bushel per horse per day. These horses are of the finest cart breed, perhaps, in the world, do heavy work, and never have any oats allowed them when at carrots. Thus we find that the culture of this valuable plant has made little or no progress, except in that angle of Suffolk, where it was established 200 years ago. But why?

The expence of carrots above turnips may be fairly estimated at 20s. an acre, and it must be at once apparent that the excess of 20s. in expence cannot be the cause of the culture spreading so little; for, to answer this expence, there are favourable circumstances which must not be forgotten. *1st*. They are much more impenetrable to frost. *2^{dly}*. They are not subject to any distempers, or accidents that approach to the evils of the anbury and the fly in turnips. *3^{dly}*. They last to a season of difficulty, (April) when stock and especially sheep farmers are so distressed, that they know not what resource to provide; a circumstance of superiority which every practical farmer must be ready enough to admit. *4^{thly}*. But perhaps the greatest superiority of all is to be drawn from the nature of sandy soils, the principles which should guide their cultivation being in general most miserably misunderstood. The misfortune is, that the value remains yet unascertained. While this remains the case, the greatest service that can be done the publick in relation to carrots, is to form various experiments with the greatest accuracy, in order to ascertain their real value per ton.

Permit me to observe, that there are one or two circumstances that should not be forgotten in the conduct of it. *First*. If sheep are fattened, the carrots to be only dug up and left in the field, and the sheep to be immediately penned within hurdles upon them.—*Secondly*. If oxen are fattened, the carrots to be laid up and given in stalls, with good hay in the racks.—*3^{dly}*. Whether oxen or sheep are the stock, they should be half fat when put to carrots.—*4^{thly}*. Whether oxen, sheep, or hogs, are fed, they should be weighed alive when they begin the carrots, and also when fat. When given to horses, they should be considered as a substitute for oats, and the value so ascertained, and not the saving of hay.

If a series of experiments were made to ascertain the value of carrots in these various uses, and the result published, it would do more to establish the practice than any other measure whatever; a practice which wants only to be well known in order to be generally pursued.—*Nov. 1781.*

[*By the same.*]

Among other uses, my crop of carrots in 1780 was applied partly to finishing the fattening of some wether lambs, that had had the summer's grass. Nov. 4, 1780, I enclosed a pen with hurdles on a dry meadow, put the sheep in, and supplied them with carrots, moving the hurdles on as they soiled the ground, so as to make it too dirty to eat upon; but as the improvement of the land was one object, being mossy and hide-bound, I did not shift them till the grass was quite black with their dung, and much better folded than is ever done in the common way.

April 3d, they were all fold and killed fat.

10 of them fold at 15s.	————	£.7	10	0
15 ————— 14s.	————	10	10	0
9 ————— 12s.	————	5	8	0
2 ————— 18s.	————	1	16	0

£.25 4 0

Value at putting up ——— 18 0 0

Product of the carrots ——— £.7 4 0

They ate four hundred and seven bushels, which at 7l. 4s. may be called 4d. per bushel.

[By Mr. KIRBY, Ipswich.]

The soil proper for the cultivation of carrots is a sandy loam. I have variously sown them after turnips, summer-land barley, and pease set upon a rye-grass ley; the crop upon the first has generally been most productive; next to that I should prefer the latter. In the first instance we feed off the turnips by the beginning of February, and then lay the land up on small balks or furrows, in which state it remains until the second week in March, when it is harrowed down, double-furrowed to the depth of about twelve inches, and the seed sown thereon, at the rate of four pounds and an half to the acre. As soon as the plants appear distinctly, they are set out with a small hoe, at the distance of six inches from each other; they are afterwards hoed twice more at different times, according as the crop seems to require it; and it is not unusual to harrow them between the hoeings, which does no injury to the root, and frequently saves the expence of a third hoeing: for these three hoeings I commonly pay from fifteen to eighteen shillings per acre.

The carrots being fit to take up, I put them out to my labourers, sometimes by the acre, and sometimes by the load, containing forty bushels; for the former, if a good crop, I pay for taking up and topping 10s. 6d. per acre; for the latter, from 1s. to 1s. 2d. per load, taking particular care of the tops, which are equally valuable with the roots for cows, sheep, and swine. After the carrots are taken up, I lay them in an out-house, and cover them well with straw, to guard them against the frost, though it is not unusual for some farmers to let them continue in the ground until they are wanted, which is less expensive; and the weather must be extremely severe to injure the crown of the root, which is more hardy than either a turnip or potatoe.—Feb. 1785.

[*By the Rev. Mr. ONLEY, of Braintree.*]

About an acre of my bean-field I have applied, as a winter vegetable, to carrots. The product with so little ploughing and no manure has been, on an average, only about 400 bushels per acre. I am however sensible they will amply repay every expence of the *finest* culture; and should, from their extensive utility, on sound, deep, and irriable land, be every where attempted. I sow in March or April; hoe three times; harrow after each hoeing; have sometimes left them in the land till after Christmas, and taken them up as wanted; but lately have taken them up in October, in dry days, put them directly into small *upright* cocks of ten bushels each, *entirely* covered, with the tops cut off; they *thus* appear to dry better than in any other mode; and with very little loss, to bear the weather. If, after being thus dried, they are carried into any barn or shed, it will be better, if in large quantities, through the hazard of heating, not to pack them *close*, but rather throw them promiscuously into *heaps*, with a little straw over them. When perfectly dry, no washing of the carrots is, in general, necessary for any cattle, except horses *regularly* kept in the stable.—Nov. 1788.

On PARSNIPS.

[*By Mr. HAZARD, of Littleton.*]

TO cultivate this root so as to make it prove advantageous to the farmer, it will be right to sow the seed in the autumn, immediately after it is ripe, or come to perfection; by which means the plants will appear early the following spring, and will get strong before the weeds can

grow to injure them. Frosts never affect the seed, nor do the young plants ever materially suffer through the severity of the seasons. Not only on this account, but for many other reasons, the autumn is preferable to the spring sowing, as the weeds at this time will keep pace with the parsnips; and often when they are hoed or cleaned, great part of the crop is pulled up, cut out, or otherwise destroyed, as they are (when sown in the spring) so small when they first appear, as not easily to be distinguished from the weeds; and if no rains fall at that season, some of the seed will not vegetate till late in the summer; and the few plants that do appear, will scarce pay the expence of cleaning them.

The best soil for parsnips is a rich deep loam; next to this is sand, or they will thrive well in a black gritty soil; but will never pay for cultivating in stone-brash, gravel, or clay soils; and they always are the largest where the earth is the deepest. Dry light land is pleasing to them; but wet, stiff, or hide-bound land is destructive. If the soil be proper, they do not require much manure. It is most adviseable to sow the seed in drills at about eighteen inches distant from each other, that the plants may be the more conveniently hand or horse hoed; and they will be more luxuriant if they undergo a second hoeing, and are carefully earthed so as not to cover the leaves.

Those who have not ground to spare, or cannot get it in proper condition to receive the seed in the autumn, may at that time sow a plot in their garden, or the corner of some field, and may transplant from thence the latter end of the month of April, or early in the May following; for which purpose a furrow should be opened with the plough about six or eight inches deep, in which the plants should be regularly laid at about the distance of ten inches from each other, taking care not to let the root be bent, but for the

plant to stand perpendicular after the earth is closed about it, which should be immediately done by persons who should for this purpose follow the planter with a hoe; and he must not forget that the plants will be injured if the leaves are covered.—It is wrong to plant parsnips by means of dibbling, as the ground thereby becomes so bound as seldom to admit the small lateral fibres (with which these plants abound) to fix or work in the earth, on which account they are prevented from expanding themselves, and never attain their proper size. It is reported, that cows and oxen are fond of parsnips; if so, they are certainly well worth a farmer's attention, especially in countries where there is a scarcity of fodder.—*June 1787.*

[ANONYMOUS.]

A Lover of Georgical Pursuits says, the parsnip is in France, and our adjoining islands, held in high esteem as a food, particularly for cattle and swine. In Brittany, especially, they mention it as little inferior in value to wheat. Milch cows fed with it in winter, say they, give as good milk, which yields as well-flavoured butter, as milk in May or June, and in as great abundance. It is much commended for swine, which rear young pigs. It also proves very useful in fattening swine.

On the ROOTA-BAGA, or Swedish Turnip.

[By Sir THOMAS BEEVOR.]

THE plants of the Roota Baga which I have sowed for seed are now in great perfection; the roots are quite sound, and as good as at Christmas; the heads are by no means so large and bushy as those of the turnip-rooted cab-

bage; they grow up with one single stem with small lateral shoots only, so that whatever may be the comparative value of the roots, the sprouts or heads will not produce near the same quantity of food as the other. Still they seem to me to be ~~most~~ sufficiently inviting to a very extensive cultivation of them; but as the last winter was remarkably mild, their hardiness to endure and abide severe and repeated frosts and thaws, is yet untried. Animals of every kind leave all other food for them.—*May 1790.*

And in another letter, dated November 20, 1791, he says, I have this year on my farm some acres of the Swedish turnip, called Roota-Baga, which notwithstanding the dryness of the summer have grown to a reasonable size, weighing upon an average about three pounds and a half each without their leaves. This crop was not sown until the 27th of June, whereas had it been sown earlier, which the drought prevented, I am very certain the plants would have been much larger; as on those gentlemen's lands where they were sown in May, the roots are at least one third bigger. However, their want of size never diminishes the crop so much as is apprehended, if at the time of hoeing them, they are left proportionably thicker on the ground. From that experience which I have had of them, I conceive from eight to ten inches to be a sufficient distance for these plants.

[ANONYMOUS.]

I have introduced into Scotland the Roota-Baga, or Swedish Turnip, conceiving that it might be of great use as an article of green food after the month of March, when usually our common turnips run all to seed, and we find ourselves at a loss for food until our grass grounds are ready,

which they seldom are until the first week of May; hence my experience of this plant is mostly confined to the spring. For their use for the table, I can confidently recommend them as of superior flavour; so much so, indeed, that after eating them none of my family would taste the other turnips. I tried my cows and fatting oxen with them, and they ate them as readily as the common turnips.

To try how the Roota-Baga would keep after being taken up, I had a few pulled in November; one half cart-load I put up in sand in a barn, and the rest I laid upon a grass-walk in my garden, to be safe from being eaten up; they lay there entirely exposed to the weather until April, when they were just as good, and the cattle ate them just as well, as if they had been fresh; those in the barn were just the same; we had them both at our own table, and found them quite as good as those we had eaten in November.

[*By the Rev. Mr. CLOSE.*]

My Swedish turnips, in the month of March, after the frosts, without either tops or tails, and perfectly cleared from dirt, weighed thirty-two tons per acre. They were transplanted, and upon ridges of the same size as the Norfolk turnips. I prefer them to the turnip-rooted cabbage; as they are equally impervious to the frost, and if partly eaten by game or vermin, the remainder of the plants do not rot. They give butter a fine rich yellow colour, when the cows are fed with them, and some *flavour* with that colour, though not near so strong as the Norfolk turnips. Bullocks fat considerably faster upon them than upon the Norfolk. They will keep, by being stacked, and the tops cut off when they first begin to shoot; until the latter end of May.—*May 1799.*

On MANGEL-WURZEL.[*By Sir THO. BEEVOR.*]

THE seed and plants are not, I think, to be distinguished, at their first growth, from some beets; but in order to ascertain the difference, (if such there was) I sowed on the same bed of mould, on the same day and hour, some seeds of the real beets; and find that, under the same management, the roots of the scarcity plant are four times as big, and the leaves of it much larger than those of the real beets. I have offered a few of the leaves of the scarcity-plant to the cows whilst going in exceeding good pasture in my park, which they readily ate; I did the same to some horses which were standing in a waggon in the harvest-field, who as readily ate the broad tender part of the leaves, but rejected the thick parts of the stalks. I have also had dressed the leaves of each of the above-mentioned plants, and brought boiled to my table; and think, as did some other gentlemen who ate of them, that there is a manifest difference in their taste; those of the scarcity-plant being so like spinach, as hardly to be distinguished from it; whilst those of the beet were both harder and drier.—*OE.* 12th, 1786.

In another letter dated Dec. 1778, Sir Thomas says, I could only try whether they would be eaten or rejected by cows, bullocks, and sheep; and whether, if left in the ground, they would so well endure the vicissitudes of frost and thaw, through the winter, as to furnish the farmer with a certain and plentiful supply of food in the spring. With respect to the first object of my trials, the report I have to make is, that I found all my cows, bullocks, and sheep, would, after two or three days, feed as readily upon them as on turnips or any other food; but with regard to the latter object, I cannot say the result was so favourable as I could have wished,

and did expect; for notwithstanding the mildness of the weather through the whole of the last winter, and the different means I used for the preservation of the roots, by covering some of them lightly with earth, others with straw, and leaving others in the state in which they had grown, I did not find half of them sound or fit for use in March.

[*By Dr. ANDERSON.*]

The Root of Scarcity is plainly a variety of the beet. The roots are of various colours, white, yellow, and red; the difference in the intensity of each of these tints was very great. The root is thick and fleshy, more resembling the beetrave, or red beet, than the common beet; the leaves large and succulent, also more resembling those of the green beet than the beetrave. The ribs of the leaves are always of the same tint with the root. The flesh of the root is coloured the same as the skin. Its taste a mawkish sweet, that is relished by very few of the persons who eat of it.

I sowed a part of the seed on a light sandy soil, and part on a rich light loam. The plants on the last prospered much better than the other. During the summer the leaves were tolerably abundant, but nothing like so luxuriant as I had been made to expect. I caused some of the blades to be gathered, but this seemed rather to retard the growth of the root. It seems to be rather more hardy during the winter than most kinds of turnips, particularly its leaves, though they do not perfectly resist our winters; I even observed, that several of my plants were killed by the frost during this winter.

The root is relished very well by cattle, and my horses eat it; but I should fear it was of a nature rather too succulent to be a very proper food for horses. I have no doubt but that cattle would thrive upon it very well, though the

quantity I had was too small to enable me to speak experimentally to that point. On the whole, though it is haps possible, that in certain circumstances this plant be cultivated with profit; yet I should suspect, that if seeds were of the genuine sort, it will not be found to general of equal value to the farmer as several plants which we have been long acquainted.

[*By the Rev. Mr. BROMWICH.*]

In the beginning of last April I prepared about a quarter of an acre of light ground, by forking it over, it having left exceeding foul and impoverished by a former tenant. March 10th, the first seeds were sown in the seed-bed transplanted into the field the 10th of May, following roots having attained the thickness of a goose-quill. May 15th, one half of the ground in the field was sown seeds, being dropped at half a yard distance from each other in the same in which they were to remain, and put about an inch deep into the soil. May 26th, the first crop of leaves was gathered, being then at their full growth, and more than a foot long, many measuring eighteen inches. A fresh crop of leaves was constantly collected afterwards every ten or a fortnight, during the summer and autumn, until it somewhat retarded their vegetation.

The first attempt in disposing of the leaves, was to give them to some milch cows, who fed upon them with avidity, and even preferred them to clover, or any thing that could be given them. Young calves were also fond of the leaves, and would hardly touch any other food after they had eaten of them, except milk. Pigs, I believe prefer them to any other vegetable that they are commonly fed with, and feed faster with them than with potatoes.

not find that horses are fond either of the leaf or root; after repeated trials they will sometimes eat a few leaves, but soon leave them for other food.

Two cows were fed four weeks entirely with mangel-wurzel leaves, and two calves eight weeks. Sept. 18th, fold four pigs at 11. each, fed entirely with the leaves from the time they were eight weeks old. Nov. 16th, fold four pigs for 51. 5s. fed with the leaves from the time they were weaned. Besides the above, upwards of twenty pigs of all sizes have been constantly fed with these leaves, since the 26th of May till the present time. Moreover, in a quarter of an acre of ground, there are about 2400 plants; the average, therefore, at 4lb. per root, makes 9600 pounds weight of root for winter provision.—*Dec. 1788.*

[*By JAMES BERNARD, esq; of Crowcombe.*]

In the beginning of the year 1788, Dr. Lettform, through the intervention of a friend, gave me sixty-seven seeds of the Mangel-Wurzel, which I sowed in the hot-bed the latter end of March 1788, and they all came up in about eight or nine days. On the 14th of May sixty-six of the plants were transplanted into a common bed in my kitchen-garden. In the beginning of August I took up one of the plants of about 3½ lb. weight, by way of taste and trial, and had the leaves and root boiled. The taste of the leaves was so much like spinach, I could scarcely have known it from that vegetable; the root had a sweet and rather earthy taste, somewhat like the beet, but not so earthy; it was more like a turnip boiled with sugar, and was far from being a pleasant food to my palate, though certainly very eatable. From its sweetness I should suppose a saccharine juice might be pro-

duced, from whence by distillation a spirit might be extracted, and possibly superior to what has been drawn from potatoes.

The plants were afterwards suffered to remain till the 18th of November 1788, when the remaining sixty-five plants were taken up, in order to be carefully put aside to be replanted again next spring for seed. I had them weighed, the leaves by themselves and the roots by themselves, and the weight of the whole crop was as follows:—

	Pounds.
The leaves and tops of the 65 plants weighed	- 202
The roots weighed	- - - - 340 $\frac{1}{2}$
Total weight	542 $\frac{1}{2}$
The corner plant, which had more space to extend its roots and branches in, was so large that I was induced to weigh it by itself, and I found the	
leaves weighed	- - - - 6 $\frac{1}{2}$
The root	- - - - 15 $\frac{1}{2}$
Total	22

[By Mr. WIMPEY.]

I have at this time some Mangel-Wurzel plants in a very thriving condition, which were transplanted; and though I have no great opinion of transplanting tap-rooted plants, especially such whose roots constitute the principal part of the produce, yet I know not if, upon the whole, this would not be the most profitable method of cultivating this plant. In that case, the seeds should be sown in a nursery-bed as early in March as the season will admit, and in the interim between sowing and transplanting, the ridges should be well prepared for the reception of the plants. The advantage of

being removed into a clean well-pulverized soil is great indeed, if a favourable season be taken for that business! It is the method I have followed several years with the turnip-rooted cabbage, and I am well convinced it is the most profitable and economical of any usage in practice. If planted three feet row from row, the intervals by horse-hoeing may be kept perfectly clean, and the ground between the plants equally so by hand-hoeing. The soil then would be in a most desirable state for a crop of barley the spring following.

In the next place, I propose to give some account of the crop and its beneficial uses. Between July and November, both inclusive, the leaves were cut three times, and a plentiful crop there was at each cutting. We began with plucking off the outside leaves, but this was soon found too tedious and troublesome. I therefore ordered them to be cut clean off about an inch above the crown of the root. This is a necessary precaution, for if they are cut too close, the rain lodges on the top, and rots the root. A dextrous labourer with a sharp long-bladed knife would cut enough for a great many hogs in a short time.

During the time the plants were growing, I often gave a few of the roots and greens together, but neither cows or pigs were at all fond of the roots in that stage of their growth. This circumstance alarmed me; but was entirely done away in the winter, for then both cows and pigs ate them as kindly as they would have done any food whatever. The roots in general were so hard and firm, that I found it necessary to have them cut in slices, which a labourer did with a small bill-hook on a tressel, and could cut several bushels in an hour. As my cows and pigs were fed with them promiscuously together with other food, I am unable to ascertain what would be the amount of the produce on any given quantity of land valued in money; but I am certain that an

acre of land planted as above would well maintain 20 store pigs from six to eight months, and in that time their improvement could not be less than 14s. or 15s. a pig.—*Aug. 1790.*

[*By Mr. FRANKLEN, Lanmihangle.*]

I am sorry and surprized to read Dr. J. Anderson's letter depreciating the Root of Scarcity. It is very clear he had not the true sort, as he says he bought it at a common seed shop. I have never yet been able to buy unmixed seed at any shop, always finding a great proportion of red and green beet; therefore I shall always raise my own seed, which requires very little trouble. Dr. Lettson's description and account of the true sort is very accurate.—*July 1790.*

This same gentleman in another letter says, Dr. Anderson must have had wrong seed, or he would not have been prejudiced against Mangel-Wurzel, which will yield thirty tons an acre (exclusive of the leaves) of good food, which may be housed like potatoes; and wheat sown on the land.

[*By Sir MORDAUNT MARTIN.*]

The superior sweetness of the cream and butter, when the cows are fed on Mangel-Wurzel, makes my family grudge every root which is applied to any other purpose. As to the culture of Mangel-Wurzel, the best time for sowing the seed must depend upon the weather: it cannot be more precarious than that of turnips, in which it often happens, the morning or afternoon makes the difference of a good or a bad crop. The beginning or middle of May seems the most desirable time, which is as early as convenient after barley sowing. Such a preparation of the seed as may make it grow faster than the seeds of weeds latent in the ground, seems necessary to facilitate their first hoeing, which at best

is troublesome, as the plants grow slow while young; and there are two or three foals in every little lump, which cannot be separated till the plants are strong enough to stand against the hoe, which they will be at the second hoeing. I think twenty-two inches is the widest that Cooke's machine is calculated for; on land in good heart, I should prefer two feet, as one large root is less trouble and more profit than many small ones.—*Fcs.* 1793.

On RAPE.

[*By Mr. RAWSON, of Glassesby.*]

HAVING from repeated successful experiments on sowing Rape on wheat, bere, or barley stubble, (ploughed as soon as possible after reaping the crop) as a spring feed for sheep, determined to try its uses cultivated as cabbage, in April last I had a plot prepared as for cabbage seed, and sown with rape; the plants came up, were very promising, and fit to put out on the 20th of June. I had prepared a seven-acre field, which had borne potatoes two years, after being well manured with the common clay gravel, and had it then in fine tilth for turnips. As I had no conception that the rape would rise to such magnitude as to injure the turnips, I marked out furrows with one furrow of the plough at ten feet asunder; laid the rape plants at eighteen inches apart against the upright side of the furrow, and covered the roots by returning the earth which the plough had thrown out with eighteen-inch hoes; I then sowed the whole field with turnip-feed by a drilling-machine of twelve inches apart, and bush-harrowed and rolled in the seed without injury to the rape plants. The rape succeeded beyond any expectation I could have formed, so as to overshade and injure the turnips for eighteen inches, at either side, which

in the intermediate spaces were a very fine crop; as nearly as I could calculate, two acres of the seven were occupied by rape, and the remaining five by turnips. The rape continued to flourish until the 1st of November, at which time it averaged upwards of twenty pounds per head—several came up to forty. Such was the amazing luxuriance of the crop, that I dreaded its not standing the winter; and on the 1st day of November put two hundred large wethers into an inclosure of thirteen acres of light land, which had been eaten bare, and began to give them the rape; they immediately took to it with eagerness, and in three days not a sheep of the whole but would attack the carter for his breakfast. I continued to give it in profusion without hay or any other food, and it not only kept, but very much pushed forward the two hundred sheep until the 1st of January. I then began with the five acres of turnips, which (with the help of a quantity of hay) did not last the sheep more than seven weeks; which evidently shews that one acre of rape was equal to three acres of turnips, although they were as good a crop as I ever saw; and had the rape been planted in three-foot rows (the manner I now purpose to treat it) and properly earthed, I have no doubt it would have been, if possible, much greater. I kept in a walled yard twenty porkers from the first of September to the first of January on the under-leaves; they, as well as poultry of all kinds, are exceedingly fond of it. I tried some Scotch cabbage, in the same situation of the rape, but they did not average more than seven pounds per head; evidently rape will flourish where a cabbage would not exist; and drought, which is the bane of cabbage, will not affect it. The numberless advantages of introducing rape in addition to turnips and cabbage, (though cabbage ought by no means to be hastily excluded) must be evident to every intelligent husbandman,

Two drills, which I left uncut, stood the winter remarkably well; so that my fears were groundless, and I have no doubt but rape will on trial be found to be the most profitable vegetable discovered, for the *first* and *last* of a course of spring-feeding sheep. — *May 1790.*

[*By Mr. HAZARD, of Littleton.*]

The proper time to sow rape broad-cast is the month of June; the land should, previous to the sowing, be twice ploughed and well pulverized; when about two pounds of clean seed will suffice for every acre, which should be equally cast upon the ground with the two fore-fingers and the thumb; for if it be cast with all the fingers, it will come up in patches, and be the means of wasting seed. When the plants appear, if they come up too thick, a pair of light harrows should be drawn length-ways and cross-ways over the land; this will equally thin them, and when the plants (that the harrows have pulled up) are withered, the ground should be rolled, and a few days after the plants may be set out with a hoe; 16 or 18 inches is the distance proper for each plant to flourish in.

The rape is cut by men with hooks or sickles, and spread thinly on the ground to dry, and when it is found in order for threshing, the neighbours are invited, who endeavour to render themselves useful. A number of cloths are in readiness, for the purpose of carrying the seed to the threshers, who perform their business on a large cloth in the middle of the field. The seed is put into sacks and conveyed home, and a field of twenty acres or more is completely harvested and threshed in one day upon the spot; nor will rape admit of being carried from the ground in the pod, as it must be perfectly ripe, and would therefore shed or scatter; the straw

the farmers burn, and dispose of the ashes, which are allowed to be as valuable as the best pot-ashes.

Rape is an excellent food for sheep, and for this purpose it will answer well on arable land; but it should be hoed and set out, and it will be the stronger, and produce a much heavier crop, if it be looked over a second time, and the earth be drawn round the stems; and should there appear any places where the crop has failed, it will be right to draw plants where they are found too thick, and plant them in the bare places; by which means a more general and equal crop may be expected; and that which is transplanted will be superior to any of that which has never been removed.

The writer has experienced the good effects of transplanting rape, and begs leave strongly to recommend it. He advises a plot of ground of about a rood, to be sown in the middle of June; this will produce plants enough for ten acres, which may be planted upon land that has previously borne a crop of wheat, provided the wheat is harvested by the middle of August. One ploughing will do for these plants; the best of which should first be selected from the seed plot, and be planted upon ridges at least two feet asunder, and sixteen inches apart in the rows; they may afterwards be horse or hand-hoed, and the earth should be drawn round their stems; and in the spring of the year this crop may be fed off with sheep, when very little other green fodder is to be found, or the leaves might be gathered and given to oxen or young beasts. From the same stems fresh leaves would sprout again, and these might be fed off by ewes and lambs, time enough to plough the land for a crop of barley or oats; but it must not be forgot that planting rape upon land the beginning or middle of July would be the most advantageous as to the crop of rape, as the leaves might be then fed off in the autumn season, and they would still produce

other leaves anew in the spring; and this method of early planting might be adopted where pease or beans had been gathered green, and sent to a market, or where any kind of pulse or green fodder had been fed off the preceding spring.

[ANONYMOUS; *Birch, near Colchester.*]

Rape will do on almost any soil, but succeeds best on those that are deep, with a clayey bottom, with manure and deep ploughing. We generally plough up the fallow early in the spring, and let it lie till the latter end of March. We then plough it again, after which we harrow it down, and lay on a coat of manure. After this is spread, we cross-plough it again in May, and get it in fine tilth by the end of June. About the first of July, or the first rain after that time we sow the seed, about half a peck on an acre. The seed is scattered with three fingers broadcast, and the land lightly harrowed and rolled. In September we hoe it in the manner we do turnips, setting the plants out at about a foot distance, and clear out the weeds. This hoeing costs three shillings an acre, but it renders the plants much stronger than they otherwise would be, and makes them produce more seed.

If any part of the field miss, we fill it up with plants from the thicker part, in the latter end of October, or beginning of November, which answers much better than transplanting them in January. The produce is from three to six quarters per acre, and the price last year was from 20*l.* to 22*l.* per last.

The plants when young are in great danger from slugs, who prey on them voraciously. The best way of preventing this is to strew over the plants a mixture of slaked lime, and wood-ashes; ten bushels of lime, and fifteen of ashes, are enough for an acre. This not only destroys the insects, but promotes the growth of the crop greatly, so that it gets to a

strong head before winter. The idea that rape impoverishes the soil seems to be a mistaken one; for we get very good crops of wheat after it. The greatest inconvenience that attends this plant is, that its straw is neither good for stoves or manure; but we burn it into pot-ash to tolerable profit.

On HEMP and FLAX.

[*By a Dorsetshire Gentleman; Dec. 1781.*]

THE profitable growth of hemp and flax is not confined to rich soils. Experience hath evinced, that they will grow well on poor sandy land, if a little expence be bestowed in manuring it. Spalding-Moor in Lincolnshire is a barren sand, and yet, with proper care and culture, it produces the finest hemp in England, and in large quantities. In the Isle of Axholme, in the same county, equal quantities are produced; for the culture and management of it is the principal employ of the inhabitants; and, according to Leland, was in the reign of Henry VIII.

When the land is sandy, they first sow it with barley, and the following spring they manure the stubble with horse & cow dung, and plough it under. They then sow their hemp or flax, and harrow it in with a light harrow having short teeth. A good crop destroys all the weeds, and makes it fine fallow for flax in the spring. As soon as the flax is pulled they prepare the ground for wheat. Lime, marle, and the mud of ponds, is an excellent compost for hemp lands.

[*By Mr. ELLERKER, Wisbeach.*]

The usual price of flax-seed is 2l. 2s. per coomb; the quantity sown is two bushels per acre. As to manure, there is none laid upon land where you intend to sow flax, but it

must be clean or sward land. If the land be sward land, or what we call grafs land, it must be ploughed but once, and harrowed fine. As to my rich land, it will bring turnips, wheat, or clover, &c. after the flax is off. The crop, managings, and getting into the barn, costs somewhat about 3l. per acre. The produce is from 20 to 50 stone per acre, according to the land. As to the score, I have sold at 5l. 6l. and 7l. per score. It does not impoverish the land, but rather improves it. An experienced man should be employed to sow it, as there are but few who understand that business. And likewise when it is fit to pull, one who knows when to put it into the dike, and when to take it out; as there is a great deal of difficulty in managing that point, without spoiling the flax.—July 1784.

[By Mr. GRAY.]

*Extract from one of the Dublin News-Papers,
for August 1787.*

“It is conjectured, and with a great degree of plausibility, that flax might be instantaneously prepared for the purpose of skutching, and all the time and labour of the present process saved, by immersing it in boiling, instead of cold water. So far as speculation may be allowed, and an analogy with the effects of cold and boiling water will hold good, there is every reason to think the experiment would be crowned with success. On a smaller scale we have the authority of a gentleman to assert, that the above mode has been practised with success. One of his under-tenants had occasion to bring some yarn to market, but had no flax prepared, and but one day intervened with the market; she pulled some green flax, and merely for experiment boiled it in a large iron pot for some time, when it so fully answered

her expectation that she was enabled to put the flax through all its operations, and bring it to market next day in yarn.

“ Sir John Sinclair tells me that a clergyman of Caithness, of his acquaintance, tried the new method successfully, and gave him some flax prepared by that method, which he put into the hands of Mr. Arbuthnot, secretary to the trustees for fisheries and manufactures at Edinburgh.”

The intention of watering flax is, in my opinion, to make the boon more brittle or friable, and by soaking to dissolve that gluey kind of sap that makes the bark of plants and trees adhere in a small degree to the woody part. The bark of flax is called the *harle*; and when separated from the useless woody part the *boon*, this *harle* itself is called flax. To effect this separation easily, the practice has long prevailed of soaking the flax in water, to a certain degree of fermentation, and afterwards drying it. For this soaking some prefer rivulets that have a small current, and others stagnant water in ponds and lakes. In both methods the water acts as in all other cases of infusion and maceration; after two or three weeks it extracts a great many juices of a very strong quality, which in ponds give the water an inky tinge and offensive smell; and in rivulets mix in the stream, and kill the fish. Nay, if this maceration be too long continued, the extracted and fermented sap will compleatly kill the flax itself. For if, instead of two or three weeks, the new flax were to lie soaking in the water four or five months, it would be good for nothing but to be thrown upon the dunghill; both *harle* and *boon* would in that time be compleatly rotted; yet the *harle* or flax, when entirely freed from this sap, and manufactured into linen, or into ropes, might lay many months under water without being much damaged; as linen it may be washed in scalding water twenty times without losing much of its strength, and as paper it acquires a kind of incorruptibility.

It appears then essential to the right management of new flax, to get rid of this pernicious vegetative sap, and to macerate the boon; but from the complaints made against both the methods of watering now in use, there is reason to think that there is still great room for improvement in that article. In rivulets, the vegetative sap, as it is dissolved, is carried off by the current, to the destruction of the fish. This prevents the flax from being stained; but the operation is tedious, and I have been told, often not complete, from the uncertainty of knowing when it is just enough, and not too much, or perhaps from neglect. In ponds, the inky tinge of the water often serves as a kind of dye to the flax, which imbibes it so strongly, that double the labour in bleaching will hardly bring the linen made of such flax to an equality in whiteness with linen made of flax untinged. This seems to be equally unwise, as though we were to dye cotton black first, in order to whiten it afterwards. These ponds besides become a great nuisance to the neighbourhood; the impregnated water is often of such a pernicious quality, that cattle, however thirsty, will not drink of it; and the effluvia of it may perhaps be nearly as infectious as it is offensive. If this effluvia be really attended with any contagious effects in our cold climates, a thing worth enquiring into, how much more pernicious must its effects have been in the hot climate of Egypt, a country early noted for its great cultivation of flax.

I have often thought that the process of watering might be greatly improved and shortened by plunging the new flax, after it is rippled, into scalding water; which, in regard to extracting the vegetative sap, would do in five minutes more than cold water would do in a fortnight; or perhaps more than cold water could do at all, in respect to the clearing the plant of that sap. Rough almonds, when thrown into

scalding water, are blanched in an instant; but perhaps a fortnight's macerating those almonds in cold water would not make them part so easily with their skins, which are the same to them as harle is to the flax. Were tea-leaves to be infused in cold water a fortnight, perhaps the tea produced by that infusion would not be so good to the taste, nor so strongly tinged to the eye, as what is effected by scalding water in five minutes. By the same analogy, I think flax, or any small twig, would be made to part with its bark much easier and quicker by being dipped in boiling water, than by being steeped in cold water.

This reflection opens a door for a great variety of new experiments in regard to flax. I would therefore recommend to gentlemen cultivators and farmers to make repeated trials upon this new system, which would soon ascertain, whether it ought to be adopted in practice, or rejected. One thing, I think, we may be certain of, that if the Egyptians watered their flax in our common manner, they undoubtedly watered it in *very warm water*, from the great heat of their climate, which would probably make them neglect to think of water heated by any other means than that of the sun. A good general practice can only be established upon repeated trials. Though one experiment may fail, another with a little variation may succeed; and the importance of the object desired to be obtained will justify a good degree of perseverance in the prosecution of the means. In this view, as the Chinese thread is said to be very strong, it would be worth while to be acquainted with the practice of that distant nation, in regard to the rearing and manufacturing of flax, as well as with the methods used by the Flemings and the Dutch.

Boiling water perhaps might at once clear the new flax from many impurities, which, when not removed till it be

not found to be suitable - by Mr. J. 187.

spun into yarn, are then removed with difficulty, and with lots of substance to the yarn. Why should not the longitudinal fibres of the flax, before they are spun into yarn, be made not only as fine, but as clean as possible? Upon the new system proposed, the act of bleaching would begin immediately after the rippling of the flax; and a little done then might, perhaps, save much of what is generally done after the spinning and weaving. To spin dirty flax with a view of cleaning it afterwards, appears to be the same impropriety as though we were to reserve part of the dressing given to leather till after it is made into a glove.

Should the plunging the flax into the boiling water not suffice to make the boon brittle enough, (as I am inclined to think it would not) then the common watering might be added; but in that case, probably, half the time usually given to this watering would suffice, and the flax might then be laid in clear rivulets without any apprehension of its infecting the water and poisoning the fish, or of being discoloured itself; for the boiling water into which it had been previously put, would have extracted all the poisonous vegetative sap, which I presume is what chiefly discolours the flax, and kills the fish.

On the Cultivation of MADDER.

[ANONYMOUS.]

THIS gentleman recommends it, because first, it is certainly consistent with true national policy to cultivate every thing consumed either in food or manufactures, to which our soil and climate are favourable; and secondly, because madder, while it yields considerable profit to the planter, cleans and meliorates the soil in a remarkable degree. Some years since, the London Society offered a premium of 5l.

an acre on all lands planted with madder. This, it was expected, would have rendered the cultivation of it general; but the proper method of raising it being then imperfectly understood, the experiments of a few persons failed; and this so far discouraged others, that little further progress was made in this important article of consumption. The farmers could not, or at least would not, see the difference between a crop failing through *improper management*, and through a natural unfitness of soil or climate, which would in all cases operate against it.

But Mr. ARBUTHNOT was not weak enough to be governed by this mistaken prejudice. He saw what the errors were which had occasioned some of the planters of Madder to be unsuccessful, and determined to avoid them by undertaking it on a new plan, and prosecuting it with a spirit becoming its importance. The attention he gave to every particular of soil, situation, season, manure, &c. overcame every difficulty, and enabled him to cultivate madder with great success and advantage on soils not remarkable for their fertility.—*March 1780.*

On MUSTARD.

[*By the Rev. Mr. ONLEY.*]

THE white mustard requires rather an heavy soil, which must by tillage be brought into a nice mould; it must be sown in March at one bushel an acre; be always twice, and frequently three times hoed, and set out at about ten inches plant from plant. The crop is reaped in August, and leaves the land in sufficient tilth for any crop of other grain or corn that may be chosen to follow it: the *medium* produce three quarters per acre, and the medium price 10s.

per bushel. Mustard never follows mustard; but may be sown on the same land again in the third year. The first hoeing is worth 4s. the second and third 3s. per acre.

On the BUSH-VETCH.

[By the Rev. Mr. SWAYNE.]

THE Bush-Vetch [*Vicia sepium* of Linnæus] is a plant of the class *diadelphia*, the order *decandria*, the genus *vicia*: the sixth species of Withering, and the seventh of Hudson. The root is perennial, fibrous, and branching; the stalks are many, some of them shooting immediately upwards, others creeping just under the surface of the ground, and emerging some near to, and others at a considerable distance from, the parent stock. The small oval leaves are connected together by a midrib, with a tendril at the extremity; the flowers are in shape like those of the common vetch, of a reddish purple colour; the first that blossom usually come in pairs, afterwards to the number of four at a joint; the pods are much shorter than those of the common vetch, larger in proportion to their length, and flatter, and are of a black colour when ripe; the seeds are smaller than those of the cultivated species, some speckled, others of a clay colour.—Being a perennial, it should seem to be a very proper kind to intermix with grass seeds for laying down lands intended for pasture; and that it is as justly entitled to this epithet as any herbaceous plant whatever, I think I may be allowed to affirm, having observed a patch of it growing in one particular spot of my orchard for these fourteen or fifteen years past. It is not only a perennial, but an evergreen; it shoots the earliest in the spring of any plant

eaten by cattle with which I am acquainted, vegetates late in autumn, and continues green through the winter, though the weather be very severe; add to this, that cattle are remarkably fond of it. These peculiarities, it should seem, would make it particularly valuable to the farmer as a green food for his sheep in the winter and spring, when food of that denomination is so exceedingly scarce.

I imagine the chief reason which has hitherto prevented its cultivation, has been the very great difficulty of procuring good seeds in any quantity. The pods, I find, do not ripen altogether; but as soon almost as they are ripe, they burst with great elasticity, and scatter the seeds around; and after you have procured the seeds, scarce one-third part of them will vegetate, owing to an internal defect, occasioned by certain insects making them the nests and food for their young.

In the autumn of the year 1782, I collected a quantity of these seeds from the hedges, &c. March 15th, 1783, I sowed them in drills in a plat of ground in my kitchen garden, which measured exactly five yards square; they were sown in eight drills, as thick in the drills as I would have sown pease. They came up very thin and irregular; in some places there was more than a foot vacancy between plant and plant. This I was much surprized at, as the seed had been carefully preserved during the winter, and I could not, from their appearance at the time of sowing, suspect them to be in the least defective. The plants grew very sparingly till towards the autumn, but before winter they made a tolerable appearance.—Early in July 1783 I collected some seeds from the hedges, tied them up in a paper, and put them in a drawer of my bureau. Upon opening the paper in September, I observed a vast number of dead flies in it, and as many of the seeds with a small hole in each. The number of the flies was 280; the whole number of the seeds 1080.

These flies, upon examination, proved to be a small species of *ichneumon*. This puzzled me not a little, as I had learnt that these insects were termed a race of cannibals, from their *larvæ* or caterpillars always feeding on other insects. Upon which I opened many of the other seeds that had no holes in them, and in several of these discovered another insect alive, and in different states of its growth. This proved to be the *bruchus pisi* of Linnæus, a near relation of the weevil [*curculio*] and the *attelabus*. From hence I surmised, that at the time when the bush-vetch blossoms, the female *bruchus* lays her egg within the blossom, and the *ichneumon* immediately after deposits her egg in the same place.

After the frosts were over, I was much pleased to observe, that scarce a plant of my vetches had been killed by them, and their verdure very little injured. In April 1784, they had entirely filled up the ground, and were beginning to flower; at this time I found, as I expected, numbers of the *bruchus* intruding themselves into the blossoms before they were scarcely open, and the attendant *ichneumones* ready to follow them. I used every method I could think of to chase away these insects from my crop, by strewing foot over, kindling smoaky fires around, &c. but all to no purpose.

In the beginning of May the vetches were in full blossom, and it was amazing to see what a croud of insects were swarming about them. At that time, I intended to preserve the vetches for feed; but some time after, observing that they were beginning to rot from their over-luxuriance, I cut them, without taking any particular account of the produce. They were cut twice afterwards during the summer. Having remarked in general that the produce of these cuttings was very great, I was determined this year to keep a particular account. The whole plat then of twenty-five square yards produced,

1st cutting	^{bu.} 16 green	supposed ^{bu.} 4 dry
2d ditto	130 ditto, would have weighed	21½ dry
3d ditto	62 ditto, would have weighed	14 dry
4th ditto	76½ ditto, would have weighed	12½ dry.
Total 284½ green		52 dry.

An acre therefore, (reckoning 4840 square yards to the acre) in the same circumstances, would have produced the total amount of

tons.	cwt.	qrs.	lb.
24	11	3	3 green
4	9	3	15 dry fodder.

N. B. You are to recollect, that at the time the first cutting was made, there was scarce a green blade of grafs to be seen; and that the season, till after the third cutting, was as unfavourable to vegetation as perhaps any in the memory of man.—*OR.* 1785.

[*By Sir THOMAS BEEVOR.*]

I have had sent me this week an account of a most wonderful production of vetches; upon two plants sown in the garden of John Berney Petre, esq, of Westwick, in Norfolk, there were found (after several had been accidentally plucked off) no less than 994 pods, containing on an average six seeds in each pod; in all 5964 seeds. -

Mr. Petre, who sent me the account, did not know the name of the plants; but from a branch of it which he sent me, with the account, I have great reason to believe it to be the broad-leaved many-flowered vetch of Crete; for it had upon it some deep purple flowers, and is a perennial plant, as he assured me; however, not having any botanical book by me at present, I cannot be at all certain of the truth of my conjecture.—*OR.* 1787.

On PLANTS and their PROPERTIES.

[*By Mr. A. CROCKER, of Frome.*]

Butterworth—Yorkshire Sanicle—on Bogs.

IF the fresh-gathered leaves of this plant are put into a strainer through which the warm milk from the cow is poured, and the milk is set by for a day or two to become acedcent, it acquires a consistence and tenacity; the whey does not separate, nor does the cream. In this state it is an extremely grateful food, and used as such by the inhabitants of Sweden. Half a spoonful of this prepared milk, mixed with fresh warm milk, will convert it to its own nature; and this again will change another quantity of fresh milk, and so on *ad infinitum*. The juice of the leaves will kill lice in sheep and other animals. The common people use it to cure cracks or chaps in cows' udders. This plant is thought to occasion the disease called the rot in sheep. No cattle will feed on this plant,

Sheep's Fescue.—An excellent grass, which flourishes best in a dry sandy soil. Cows, horses, and goats will eat it; but it is the favourite food of sheep.

Flote Fescue.—In wet ditches and low lands common.—The seeds of this grass are small, but very sweet and nourishing. In divers parts of Germany and Poland they are collected under the name of Manna seeds, and served up in soups and gruels at the tables of the great, on account of their grateful flavour, and nutritious quality. When ground to meal, they make bread very little inferior to that in common use. The bran is a remedy for the worms in horses, but they must be kept from water for some hours afterwards. The seeds are excellent food for geese.

Broom-Grafs, [*Compact. Hordeaceus.*].—The seed of this grafs, mixed with corn, is useful for bread. The panicles are used in Sweden for dying green.

Couch-Grafs: too common every where!—But this plant has its uses and its virtues. The roots, dried and ground to meal, have been used to make bread in years of scarcity. Dogs eat the leaves as an emetic. *Boerhaave* recommends the juice to be drunk liberally in obstructions of the viscera, particularly in cases of schirrous liver and jaundice. Cattle who have schirrous livers in winter, soon get cured by eating it in the spring.

Burnet is so luxuriant as to allow three mowings in a season. The young shoots make an agreeable salad. The green leaves give a grateful flavour to wine.

Goose-Grafs; i. e. *Yellow Ladies' Bedstraw*.—The flowers will coagulate boiling milk, and the best Cheshire cheese is said to be prepared with them. They yield an acid by distillation. Boiled in allum-water, they tinge wool yellow. The roots dye a fine red, not inferior to madder, and in the island of Java are used for this purpose. The seeds may be used instead of coffee.

Holly makes an impenetrable fence, and bears cropping. Sheep are fed in the winter with the croppings. Birds eat the berries. The bark fermented, and then washed from the woody fibres, makes the common bird-lime. The beauty of its scarlet berries never suffers from the severest of our winters. The wood is excellent for veneering, and is sometimes stained black to imitate ebony. Handles for knives, and cogs for mill-wheels, are made of it.

Gromwell; i. e. *Bastard Alkanet*; in cornfields common. —The girls in the Northern parts of Europe paint their faces with the juice of this root on days of public festivity. The seeds are hard as bone, and effervesce with acids. The

bark of the root tinges wax and oil of a beautiful red, similar to what is attained from the root of the foreign alkanet.

Berage.—By the experiments of *Marggraff*, *Mem. de Berlin*, p. 27, it appears, that the juice of this plant affords a true nitre. The young and tender leaves are good in fallads.

Bindweed, [*Convolvulus Major*].—The root is a very acrid purgative to the human body, but hogs eat it in large quantities without sustaining any injury. Scammony is the inspissated juice of a species of *Convolvulus* so much resembling this, that they are not easily distinguishable.

Dwale, i. e. *Deadly Nightshade*.—Is a plant rankly poisonous throughout.

Buck-Thorn.—The syrup is used as a purgative, but frequently attended with much sickness and griping. The juice of the unripe berries is used for staining maps or paper yellow. The juice of the ripe berries, mixed with allum, is the sap green of the painters; but if gathered late in autumn, the juice is purple. The bark affords a beautiful yellow dye.

Ivy.—The roots are used by leather-cutters to whet their knives upon. The small branches stuck over the branches of wall-fruit in February are the best preservative against frost affecting the bearing blossoms. The leaves are often given to sheep in deep snows.

Madnep, i. e. *Cow's Spendylum*, *Cow Parsnip*.—The poor people in Poland prepare a liquor from the leaves and seeds, which, when it has undergone a fermentation, is drunk instead of ale. The stalks, when peeled, are eaten by the inhabitants of Kamtschatka. The Russians take the leaf-stalks of the root-leaves, peel, and hang them up in the sun to dry a little; then they tie them up again until they become yellow; in this state they put them into bags, and a mealy substance like sugar forms upon the surface; this they shake off, and treat their guests with as a great delicacy.

Elder.—The whole plant is a narcotic. The inner green bark is purgative—in small doses diuretic, and has been of eminent service in dropfies, and obstinate glandular obstructions. If sheep that have the rot are placed in a situation where they can get at the bark and young shoots, they will soon cure themselves; therefore it is worthy of propagation.

The Milk-Thistle is eaten young, as a salad. The stalks peeled, and soaked in water to take out the bitterness, and then boiled, are excellent. The scales of the cup are as good as artichokes. The root is good to eat early in the spring.

The Barberry, or Pipperidge Shrub, is excellent for quick fences in pasture lands. The berries are so very acid, that birds will not eat them; but when boiled with sugar, make an excellent rob or jelly. The roots boiled in lye dye wool yellow. In Poland, they dye leather of a most beautiful yellow with the bark of the root. It is said to be prejudicial to corn-lands. ...

Heath—Erica, common on lofty barren hills, and though little regarded, might be made to serve many valuable purposes. In the Highlands of Scotland, the poor inhabitants make walls for their cottages with alternate layers of heath, and a kind of mortar made of black earth and straw. They also make beds of it; and their houses are thatched with it. —In the isle of Ilay, ale is made by brewing one part malt, and two parts of the young tops of heath.—Woollen cloth boiled in allum-water, and then in a strong decoction of the tops of heath, comes out a fine orange colour.—The stalks and tops will tan leather. Bees extract great quantities of honey from the flowers, which are very beautiful.

Wild-Roses.—The ripe fruit makes a pleasant rob. The juice diluted with water dyes silk and muslin of a peach colour; with the addition of allum, a deep violet; but it has little effect on woollen or linen,

The Lime Tree flourishes best on the sides of hills, is easily transplanted, and grass grows well beneath it. The bark, macerated in water, may be made into cordage and fishing nets. The flowers afford the best honey for bees. The sap, when inspissated, yields a quantity of sugar.

Larkspur.—The expressed juice of the petals, with the addition of a little allum, makes a fine blue ink.—The seeds are acrid and poisonous.

Ground-ivy.—The leaves thrown into the vat with ale, clarify it, and give it an antiscorbutic quality.

Chickweed.—The young shoots and leaves when boiled can scarcely be distinguished from spring spinach, and are equally wholesome. This is one of the sleeping plants.

The Beech-Tree is large and beautiful, but no verdure will flourish under it. The nuts, or masts, well dried and powdered, make wholesome bread. They are sometimes roasted and substituted for coffee. In *Silesia* the poor people use the expressed oil instead of butter. They are excellent for fattening swine.

The Scotch Fir flourishes best in a poor sandy soil. The Northern nations make bread of the bark.

Willow, and Poplar.—The common uses of these trees are well known; but that species called *Abele*, or *Populus Alba*, (common in woods and hedges) deserves particular notice, on account of the virtue its bark possesses in curing intermitting fevers. The Rev, Mr. Stone, in *Phil. Transactions*, vol. liii. p. 195, tells us, that he gathers the bark in summer when it is full of sap, and having dried it by a gentle heat, gives a dram powdered every four hours betwixt the fits. In a few obstinate cases, he mixed one-fifth part of Peruvian bark with it.

Pistia of the Wall.—The leaves of this plant, strewed in granaries, destroy the weevil in corn.—*March 1785.*

[*By. Mr. BENJ. AXFORD.*]

On inspecting pasture and meadow-lands in general, many noxious and poisonous plants will be found, and sometimes in considerable quantities. Of these kinds are, among others, the following: henbane, hemlock, the aconite, or deadly night-shade, and several species of dropwort; which, if taken in with their food by cows, &c. will generally cause disease, and sometimes death.

In proportion as pasture-lands are cleared of these and other noxious plants, the danger is lessened; and a considerable advantage will be derived from such lands being, by this means, rendered capable of producing a larger quantity of wholesome herbage.

All neat beasts have a natural tendency to scouring and flatulent disorders. It is therefore a duty of the greatest importance to the farmer to sow and plant in his pastures and hedges such herbs, in proper quantities, as are found to be the best remedies for these and such other complaints as cattle are most incident to. Among many that might be mentioned, the following herbs are very salutary: lovage, agri-mony, carraway, and cummin.

The general produce of ant-hills in this country has often been (through mistake) supposed to be wild thyme; and as this herb is salutary in its nature, farmers have suffered these hills to remain in their pastures, from an apprehension that they furnished a medical repast to their sheep and cattle. But on a careful examination, any person may be convinced that, in general, the produce of ant-hills is, a *little* of the wild thyme, (which I never observed to be touched by cattle) and a much larger quantity of poor small rushy sour grass, which is a very pernicious kind of food both for cows and sheep. The extirpation of ant-hills is, therefore, an essential part of good husbandry.

Cattle, when confined in foul inclosures till their food becomes scanty, will, through hunger, devour a considerable part of such noxious plants with the rest of the herbage.

The seeds esteemed the most salutary in promoting an increase of milk are those of trefoil, sainfoin, angelica, pimpernel, cummin, and anise. About the walls of houses, and on the insides of hedges, sow lovage.

On RHUBARB.

[*By R. D. of Minthead.*]

THE seeds sown upon a very gentle hot-bed in March, readily vegetate; and when the roots are about the size of a crow's quill, they should be carefully drawn up to preserve the tap-root, and planted in fine rich earth in a deep soil; and if the weather should prove dry, they must be watered. When the plants are once in a growing state, all further care and trouble, but that of keeping them free from weeds, is at an end.—The distance of the plants from each other should be eight feet; and as they disappear about seven months in the year, in this interval the ground may be usefully employed in many articles of gardening, from the middle of August to the beginning of April.

[*By Dr. MOUNSEY, of Russia.*]

The proper time for planting the seeds of the Chinese or the Turkey Rhubarb, is in April or May: they may be planted in flower-pots, three or four seeds in a pot, and plunged in a hot-bed until the seeds vegetate. When the plants are about two months old, let them be transplanted into the place where they are to remain, which should be in a fine light soil. It may not be improper to keep some of

the plants in the pots till October, and some till the spring following, and then plant them out as above. When by these precautions you have secured a sufficiency of plants, you may afterwards venture to sow your seeds in the open air, as I have constantly done with success. If the seeds vegetate late in the season, they ought to be covered with mulch or moss, to preserve them in winter. When transplanted set them at least four feet asunder in the quincunx order, or in square rows; hoe them and keep them clean from weeds and let the ground between each row be turned up yearly taking care not to touch the roots. In the second or third year, the plants will begin to bear seeds, which you may sow at various times after their maturity, till you find which season suits them best. The earliest period at which the roots are useful, is at four years' growth, but even then they will be soft and spongy. So that unless for curiosity, or through necessity, they should remain eight years undisturbed, although still more years will add greatly to their perfection. The roots are to be taken up in autumn after the stems and leaves are withered and decayed, but the planter may take them up in every season of the year, when he has a sufficient number, as it is uncertain at which season the roots will prove most solid. Upon taking them up, split them into two or three pieces, and hang them upon cords or rods in kitchen or room with a stove in it, that they may dry with a gentle heat.—*Sept. 1778.*

[By G. P.]

The seeds of the Rhubarb plant do not require any hot beds to make them vegetate; but if sown in the natural ground in the spring, when the weather is open, soon come up, and thrive very fast. It delights most in a rich, light, deep soil, and

warm exposure; but will thrive in almost any soil or situation. If the roots be covered with litter, or the earth be drawn over them in winter, they will rise the stronger in the following spring. The seeds should be sown where the plants are to remain; and when they appear, the ground should be kept clean from weeds. When thinned out, the distance from plant to plant should be eight feet.

As to *curing* the root for medicinal uses, I must own myself a novice in the art, this being the first year I ever attempted it; and my roots being dry, I cannot, with any precision, say how they will turn out; but submit the following hints to your consideration:—To have the root of a fine close grain or texture, drying it gradually seems to be essentially necessary. I take mine up, clean it from all dirt, and lay it in the shade, under a shed for two or three days, where, without becoming shrivelled, it will lose by degrees the exuberant moisture it had when recent from the earth. If it be exposed too suddenly to heat, either natural or artificial, or a very drying air, the root grows wrinkled, and is always horney or flinty.—*Os.* 1778.

[By Dr. LETTSOM.]

There is every reason to conclude with Linnæus, that the *Rheum Palmatum* is the Turkey or Russian Rhubarb.

The root is perennial, but throws out annually, from its crown and sides, new shoots or bulbs, which flower and decay in succession.—It may probably be of little consequence, as to the vigour of the roots, whether they are taken up in summer or autumn; but as warm weather is best for drying them, the former seems most eligible.—The roots, if large, should be sliced, so as to admit of a free exsiccation.—I believe Rhubarb delights in a sandy soil, on a somewhat elevated situation; such a soil as carrots will flourish in.—*Nov.* 1778.

[ANONYMOUS.]

In the summer of 1771, I had a plant of the true *Rheum Palmatum*, in great vigour and in full flower, growing at the distance of about four yards from a plant of the *Rheum Compactum*, which was likewise at the same time in flower. As the first was the plant generally allowed to be the true Turkey Rhubarb, I carefully collected and preserved the seeds of it, which I sowed early in the spring of the year 1772, in a bed of common light earth, about half an inch deep. In about five weeks the plants appeared in great plenty. But what seemed most remarkable in them was, that the leaves were neither those of the *Palmatum* or *Compactum*, but like a perfect mixture of both; very large and broad like the *Compactum*, but terminating in long sharp points, and in some degree indented; and resembling the *Palmatum*.—Dec. 1778.

[By Dr. FALCONER.]

Rhubarb is the *Rhaved* of the Arabians; the *Rha Barbarum* of Alexander Trallianus; the *Rheum* of Paulus Aegineta; the *Rheum Barbarum* of Myrepsus; the *Rha Barbarum Officinale* of Caspar Bauhin, and of the London Dispensatory. What it is of Linnæus, I cannot say. Dr. Lewis says, it is the *Rheum foliis subvulosis pelioris æqualibus*, Linnæi, *Spec. plant.*; and so says Mr. Vogel. Now this description is affixed by Linnæus to the *Undulatum*, which is not at present understood to be the true Rhubarb. On the other hand, Dr. Rutty asserts the *Palmatum* of Linnæus to be the true Rhubarb; and I believe that opinion is now generally thought to be right by the best botanists and ablest physicians. It is called *Rha*, by the Tartars; and from thence is derived *Rha Barbarum*, as growing among barbarous na-

tions. It is named Rha, from the river Volga, which is so called by the Tartars, near which it is cultivated. It was first mentioned by Alexander Trallianus, in the year 560, but appears to have been in use among the Arabs prior to that period.—In earlier times, the *Rhapontic* was thought to be the true Rhubarb, and spoken of as such by Dioscorides and Celsus; being the *Rheum* or *Rha* of the former, and the *Radix Pontica* of the latter.

The marks of its goodness are, to be perfectly dry and and friable, yet with a good degree of hardness or solidity, and perfectly uniform in its substance. It generally comes to us in roundish pieces, with a hole through the middle of each, and is externally of a yellow colour, but that in foreign Rhubarb is often artificial. When cut, it is of a fine reddish yellow, variegated with lively reddish streaks, intermixed with white. When powdered, it appears of a bright yellow, and on being chewed, imparts to the spittle a deep saffron tinge. Its taste is rather acrid, bitterish, and somewhat astringent; its smell is lightly aromatic; when chewed it seems gritty, as if sand were mixed with it.

The specimen of Rhubarb presented to the Society, and submitted to my examination, answered to all these qualities. I compared it with specimens of the best Turkey and East-Indian kinds. It was rather, though very little, less aromatic and refinous than the former; and had somewhat fewer of the reddish streaks through its substance, but was much clearer, and more distinctly marked, than the East-Indian.

In specific gravity, it was near the Turkey, and not so hard or heavy as the East-Indian. In taste, I could not distinguish it from the Turkey, except that I thought it somewhat, though very little, fainter. The tincture made with brandy was of a bright, clear, yellow colour, not distinguishable from the Turkey, but superior to the East-Indian.—

The infusion with water was also nearly, if not altogether, equal in colour, taste, and smell, to the Turkey, and superior to the East-Indian. ¹ The smell of the powder was not distinguishable from the Turkey, and superior also to the East-Indian. I tried its purgative virtue in several instances: and another gentleman, to whom I gave some of it, tried it also in several other cases. We agreed perfectly in our account, that its operation was in every respect such as might be expected from the best foreign rhubarb. I think the specimens shewn to me are extremely good in their kind, very little (if at all) inferior to the best brought from Russia or Turkey, and fully sufficient to supply the place of foreign rhubarb.

[By Dr. FOTHERGILL, of London.]

The rhubarb which has been chiefly cultivated in this country, as the true officinal rhubarb, is undoubtedly the *Rheum Palmatum*. From the appearance of the root when properly cured, and from its effects when used as a medicine, it seems to approach very near to, if it be not really, the rhubarb of the shops. Many trials have been made of it, and the reports of it are in its favour. Yet I own I have my doubts, and think it would scarcely be advisable to recommend a general culture of it. There is something in the native soil that imparts a virtue to plants which they sometimes do not possess in other places.

Of all the objects of culture in this country, I should least of all be disposed to promote the culture of drugs. What virtues they have, if they are good, we know pretty well; but as there is nothing more difficult in the course of practical science, than to ascertain the virtue or precise effect of any drug, so we may consider that which is raised in an unnatural or different soil, as a medicine of untried virtue. It

may be the same with that which we import; it may, however, be different in some latent circumstance, and more or less operative, and must therefore subject practitioners to the risk of disappointment, or the solicitude of attending numerous experiments, when they have already a medicine at hand of the effects of which they are pretty certain.

We have three different markets, from some of which we may always hope to be tolerably well supplied with this drug; from Turkey, Russia, and the East-Indies. The kinds are in some respect different, but the differences are generally understood.—In all other important articles which can be raised better and cheaper than those we import, by all means let us cultivate them, and with assiduity. Whatever other nations can raise and sell cheaper than we can do, and are willing to exchange for our manufactures, let us import from abroad. This is just policy and œconomy.—*Jan. 1779.*

[*By Dr. PULTENEY, of Dorchester.*]

The famous naturalist and Siberian traveller, M^r. Pallas, seems to have determined the *Russia* rhubarb to be the *Rheum Palmatum*; and that the *Chinese* rhubarb is the species which Linnæus once thought to be the true rhubarb; and described as such in the *Amœnitates Academicæ*, under the name of *Undulatum*. I have been informed, that these two species, planted near each other, will produce a mongrel plant, the seeds of which are not fertile; and I should not be surprized to hear that the root of this *hybrid* excelled that of its parent plants. Bergius, the latest author on the *Materia Medica* that is come to my hands, tells us, that the *Chinese* get up their rhubarb-roots in winter. He himself advises the taking them up in autumn, and says they require to be eleven or twelve years old.—*March 1783.*

[*By A. FOTHERGILL, M. D. F. R. S.*]

Mr. J. R. Foster, in his history of "Voyages to the North," very lately published, informs us, from the most authentick accounts, that at Suchur, a province subject to the Great Khan of Tartary, where the true rhubarb-plant flourishes in the greatest abundance, and from whence the merchants carry it all over the world, the country is rocky and mountainous, the soil red, with a stratum of stone under it, sometimes boggy, being every where intersected with numerous rivulets. At Kathay, and some of the more remote provinces, this root is held in no estimation, except for the diseases of horses, and for the purpose of common fuel. But at Suchur, where its value is better understood, its culture and management are duly attended to, and their method seems worthy of imitation in Great-Britain. The plant, in its native soil, flourishes luxuriantly, and the roots, when arrived at their full growth, are of enormous size; the larger ones often measure three quarters of a yard in length, and are of the thickness of a man's body.

The roots are dug up in winter, before they put forth leaves, because they then contain the entire juice and virtue of the plant; those that are taken up in summer being of a light spongy texture, and unfit for use. The root, being thoroughly cleaned, is cut transversely; and the pieces are placed on long tables, and turned carefully three or four times a day, that the yellow viscid juice may incorporate with the substance of the root. If the juice be suffered to run out, the roots become light and unserviceable; and if the roots are not cut within five or six days after they are dug up, they become soft, and decay very speedily. Four or five days after they are cut, holes are made through them, and they are hung up on strings exposed to the air and wind, but are

sheltered from the sun-beams. Thus, in about two months, the roots are completely dried, and arrive at their full perfection. M. Thouin, superintendant of the exotics at Versailles, informs us, that the recent stem is converted into a marmalade, and is considered as a mild and pleasant laxative, and highly salubrious.—*March 1783.*

[By Mr. HAYES, Surgeon, Hampstead.]

Having found myself disappointed, for many years back, in raising the rhubarb plants from seed, in the open borders of my garden, I was induced to try what success I should have by separating some of the eyes or buds, which shoot out on the upper parts of the root, together with a small part of the root itself, with some of the fibres to it; many of these may be seen, both in the spring and autumn, on plants of three or four years old. My success was equal to my expectation; and all the rhubarb plants which I now grow, are raised after the above method.—*Feb. 1787.*

[By J. S. Boreatton, Salop.]

A plant of the *Rheum-Palmatum*, the sixth year after it was sowed, grew between the months of April (when the stalk first appeared out of the ground) and the middle of July (when it was at its greatest perfection) to the height of 11 feet 4 inches; when an observation was made on its growth, it grew in one day 3 inches, and in one night above 4. Many of the leaves were above 5 feet long, the numerous branches all covered with blossom, and then with seed; in the latter state by much the most beautiful. In October the seed was quite ripe, and the plant died down to the ground; the root was then taken up, and weighed 36lbs. when washed, and deprived of its small and useless fibres.—*Nov. 1783.*

[*By Mr. POOLE, of Bicknoller, Somerset.*]

March 16, 1779, the rhubarb seeds were sown in the rural ground, and the 20th of March following the plants were removed from the seed-bed, and planted in a piece of garden ground 44 feet long, and 22 feet wide, divided into four beds of about 5 feet each bed; holes 20 inches deep were made for each plant, and two ranks of plants in each bed, 3 feet asunder, which I think is too near by a foot.

Nov. 15, 1782, one of the borders of rhubarb was taken up; and of the roots, after they were cut, cleaned, and dried there were left 54lbs. of good rhubarb; 50lbs. of which were sold in May last to a druggist in London for 10l.

The purging quality of this rhubarb is not so strong as the foreign rhubarb; 30 grains of this rhubarb powder being equal to about 20 grains of foreign rhubarb powder.

The Appendix to the third volume of the Bath Agricultural Papers contains a number of experiments made with English Rhubarb, by Drs. Falconer, Parry, and Fothergill, in which the virtues of this drug were thoroughly examined and confirmed.

*On Accuracy in the Characteristick Distinctions of
Plants, &c.*

[*By Sir THO. BEEVOR.*]

IN the communications of new discoveries and experiments, particularly in agriculture, it has been observed that the first publishers of them are so apt to see and represent them in a flattering light, that the public, perpetually deceived and disappointed in their high-raised expectations, become sceptical, and even averse to all trial of them. We

gentlemen, therefore, be satisfied with barely relating, and with due precision marking, the several respective disadvantages, as well as the advantages, attending the culture of the particular plants they judge proper to recommend to notice, we should much seldomer hear the reproachful terms of speculative and visionary triflers bestowed upon them.

To explain my meaning; I would, for instance, have it mentioned among their other properties, (if by experience it should be found to be so) that the Mangel-Wurzel will not endure our frosts, if left in the ground during the winter;—that the Turnip-rooted Cabbages will resist the severest frosts, but are attended with very great trouble and expence to get them out of the earth; that when taken up they require to be cut to enable the cattle to eat them, and should be used only the last of all other green food, which they will well supply, until there is a sufficiency of grass;—that the Rooter-Baga plants, though they appear to afford the sweetest and most nutritive food of all the roots, and though the value of the root has been found to be little or nothing diminished, even after it has borne its seed, yet will it not abide the severity of frost better than the common turnip; and one considerable advantage attendant upon them, as well as the Turnip-rooted Cabbages, is the vast abundance of food they each supply by their bushy tops in the spring;—that the Mowing Cabbage seems better calculated for culinary uses, than for cattle;—and that Cow Cabbages, to pay the greatest profit, should be all spent before Christmas.—*March 1792.*

On Sundry Topicks.

[*By* Mr. JOHN FELTHAM.]

AGRICULTURAL tracts I have not noticed encouraged in school libraries, or its objects made any part of a tutor's monitions.

It is the interest of mankind to treat all animals with kindness and humanity; to give them wholesome food; work them moderately; and by keeping them warm, clean and comfortable, shield them from those severities they (comparatively) as sensible to as ourselves.

An idea has occurred to me, which might facilitate progress of agriculture and the arts, and prove lucrative the adoption, and advantageous to the publick. It is to establish a manufactory upon an extensive scale, for making very small models of all the instruments used in or connected with husbandry, upon a neat, portable, and cheap plan.

Hedges could be made sources of much greater profit than at present is attempted. The *elder*, I conceive, if planted on an extensive scale, would produce most valuable wood far superior to some foreign; and its underwood be productive and luxuriant enough for domestick purposes.

I think plain instructions on all topicks of farming adopted on the plan of the moral tracts of the Cheap Repository, would be highly beneficial.—*June 1797.*

Hints for sowing various Kinds of Grain, from certain Phenomena of Nature.

[By Mr. WAGSTAFFE.]

PLEASE and *spring vetches*. As early as the lark arise singing, and partridges are paired.

Oats. When rooks begin to build, and the male catkins of the hazel expand and shed their farina

Barley. At the earliest discovery of the cuckoo, and white-swain buds of the black-thorn.

Cabbage, and *turnip-rooted cabbage*. At the appearance of the hyacinth, (blue-bell) and when the ring-dove (we pigeon) begins to coo,

Potatoes. When the wilding or crab-apple is in bloom; and perhaps the due period of taking them up is at the dropping of its fruit.

Buck or brank. When the hawthorn's bloom is going off with a purple hue, and the young rooks are perceived out of their nests.

Turnips. When the elder flowers, and the early cherry ripens.

Wheat. At the fall of the ashen leaf, or when the grey or Royston crows return; but these being only local visitants, most of the inhabitants in several counties not being acquainted with them, their return is in correspondence with the latest fall of the acorn, and the variegated appearance of the woods. On the appearance of the fieldfare the due period is past.—*Sept. 1789.*

On BEES.

[By Mr. J. KEYS, near Pembroke.]

ENGLAND is not defective in the production of swarms; our stocks in general emit too many, which make a great shew in number, but yield a very inadequate proportion of honey and wax, or of stocks fit to stand through the winter and spring. It is certain we have more farina to nourish the broods, than honey to feed them when bred; consequently there are but few apiaries but what may be overcharged. If none but first good swarms were preserved, and the casts or after-swarms returned back to the stocks, the increase of honey would be many fold greater than in the usual practice of the peasantry. An incorporated stock will gather more honey than three or four single ones, for reasons obvious to intelligent apiators. Hives of bees of

half a bushel measure, intended to stand, ought at *least* to weigh twenty pounds; larger hives in proportion. Nor ought they to be *above* two years old. To take the honey without destroying the bees, cannot be done by any of the present methods, without trouble, and other instruments than are yet publickly known, or in use among the commonality. It is with concern I see numbers of sober, honest, and industrious cottagers, with families, to whom a stock of bees would be a little estate, but who out of their small pittance of wages can never spare enough to purchase so desirable a resource. — *June 1788.*

On MANURES.

[*By T. S. Norfolk.*]

WE may rank all our varieties of soil under the following heads; *Sand, Clay, Gravel, Chalk, Loam, Marle.* All sands are hot and dry—all clays cold and wet; and therefore the manuring sandy lands with clay, or clay lands with sand, is the best of all, for this changes the nature of the land itself; whereas dung, and other substances, afford only an inferior and temporary improvement. Mixed soils, which incline to the clayey kind, are best of all for corn and pulse. But it is not the natural soil only that the farmers ought to consider, but the depth of it, and what lies immediately underneath it. Gravel is, perhaps, the best under-stratum to make the land prolific. The best loams, and natural earths, are of a bright brown, or hazely colour; hence they are in this county called hazel loams.

Mr. Tull thought that the only difference in soils, except their richness, is occasioned by the different degrees of heat and moisture that they receive; and that *earth*, of whatever

kind it be, is equally proper for the production of plants in general, provided the heat and moisture be equally adjusted, But in this I am inclined to think Mr. Tull is mistaken.—His instance, that rushes, when taken from a low watery ground, and planted on a dry hill, will grow and flourish there, provided a plenty of water be given them, does not prove his position; for by the addition of water the soil becomes similar to that from whence the rushes were taken.

[By B. K. Herts.]

Among the manures recommended for clay, sand is of all others to be preferred, and sea sand the best of all where it can be obtained; this most effectually breaks the cohesion. The reason for preferring sea sand is, that it is not formed wholly (as most other sands are) of small stones; but contains a great deal of calcareous matter in it, such as shells grated and broken to pieces by the tide; and also of salts. The smaller the sand is, the more easily it penetrates the clay; but it abides less time in it than the larger. Shells, marle, ashes, and all animal and vegetable substances, are very good manures for clay.—Chalky soils are generally dry and warm, and, if there be a tolerable depth of mould, fruitful; producing great crops of barley, rye, pease, vetches, clover, trefoil, burnet, and particularly sainfoin.—Light poor land seldom produces good crops of any thing till well manured.—Light rich land is the most easy to cultivate to advantage, and capable of bearing most kinds of grain, pulse, and herbage; such lands are the best adapted to the drill-husbandry, especially where machines are used, which require shallow furrows to be made for the reception of the seed.—Coarse rough land should be ploughed deep in autumn; when it has lain two weeks, cross-plough it, and let it lie rough through the winter.—May 1782.

[By Mr. PAVIER, of West-Monckton.]

For several years past I have entertained a notion, that fern being burnt upon a fallow ground would produce an excellent dressing for turnips and wheat. The ashes of fern are stronger than any other, and must consequently, on account of the great quantity of salts they contain, be of infinite service in promoting vegetation.

In the course of last summer (1778) a farmer who lived in my neighbourhood had a field of five acres under a fallow for wheat. It lay adjoining to a common which produces abundance of fern, and I obtained a promise from him to dress a part of it therewith. One other part of the field was dressed with dung alone; and the remainder with a mixture of lime and old mud taken out of a mill-pond at the bottom of the field. This last-mentioned dressing was well mixed, and laid on in a large quantity. No exact account was kept of the expence of the fern-dressing, nor of the quantity used; we can, therefore, only guess at these particulars. It is, however, an undoubted fact, that 3s. 6d. is more than sufficient to pay for cutting, drying, and carrying a waggon-load in such a convenient situation; and upon due enquiry, I was informed that about four waggon-loads were laid on an acre; consequently it must have been as cheap a dressing as could possibly be laid on it.

This field of wheat was reaped the 3d instant; as far as the fern was burnt, (which was two acres) the wheat was in every respect the best in the field; being taller, stronger, thicker, the ears larger and finer, and the crop very clear from grass and weeds. The reapers all declared they had not cut any wheat so good this season. The part dressed with lime and mud was better than that dressed with dung only, that being the worst of all. The owner of the wheat

and myself were both of the opinion, that the difference in respect of quantity of sheaves was in favour of the fern-dressed part, nearly as seven to five; but the difference with respect to the quantity of clean corn must certainly be in a greater proportion, by reason of the ears being so much larger and finer.—*Aug. 1779.*

[ANONYMOUS; *Essex.*]

Soaper's ashes were laid upon clover, sixty bushels per acre to great advantage, and are found very beneficial on cold, wet, spongy land. An acre of land for wheat was dressed with ten bushels of old feathers ploughed in as they were spread; the acre thus manured produced near forty-eight bushels, the rest of the field not twenty-eight on the average.

[*By Sir THOMAS BEEVOR.*]

The following is the composition of a new oil manure, with the expence, for one acre of land:

Rape, or train-oil, 6 gallons, at 2s. 6d.	—	£.0	15	0
Sea-sand, 6 bushels, at 2d.	—	0	1	0
Coarse salt, 2 bushels, at 1s.	—	0	2	0
Malt-coombs, 24 bushels, at 4½d.	—	0	9	0
		<hr/>		
		£.1	7	0

The method of preparing it is, to spread the coombs on the floor about four inches thick, then sprinkle the salt as level as you can; throw on half the quantity of sand, and half the quantity of oil, out of a watering-pot; turn it and rake it well, afterwards add the rest of the oil and sand as before; turn it well till thoroughly mixed, and then throw it in a heap for use.—*June 1776.*

[ANONYMOUS; *Norfolk.*]

At the lower end of my farm-yard is an old pond or reservoir of water, which is the receptacle of every thin that drains from the other parts of my yard, stables, and the ditches of several fields. Finding this water of advantage in my garden, in the latter end of July 1772, I measured out two spots of fifty square yards each, in an adjoining meadow which had been mowed, and was much burnt up. And in order to prove this water, I watered one spot with it, and the other with water from a small adjacent river, three times a week, for a month together, there being little rain all the time. And on the spot which had been watered with the pond-water, the grass was much thicker and higher than the other; being as strong and succulent as any part of the first crop had been, of a deep healthy green, and near eighteen inches high. I cut both, and kept them separate, in order to ascertain the comparative value of the hay. On weighing each, I found that on which the pond-water had been used near double in quantity, and much superior in quality, to the other.—*July 1779.*

 [ANONYMOUS.]

Mortimer tells us, that ashes of *all* kinds contain in themselves a very rich fertile salt, and that, therefore, they are the best of any manures for cold land, especially if kept dry, and the salts be not washed away by the rains. One load of *dr* ashes will be equally efficacious with two loads that have been kept wet. Coal-ashes being of a calcareous quality are particularly beneficial to sour stiff soils; they open and meliorate clayey lands, and correct their ungenial qualities.

Mortimer and Bradley both agree, that sea-coal ashes are the best and most lasting manure for cold lands, and the

fitest to kill worms and other insects. Worlidge tell us, that they kill moss and rushes in moist grounds.


Ashes from kilns, where straw and furze are burnt, are a very good manure for most kinds of soil. Peat-ashes are good manure, if mixed with lime before they are spread.

Ashes burnt from fat black peat, such as is dug about Newbury in Berkshire, and in some parts of the Isle of Ely, are of so sulphureous a nature, that farmers are afraid to lay them on their barley; nor do they dress their wheat with them till late in the spring. About eight bushels are sufficient to be sown over an acre of wheat, pease, turnips, clover, rape, or sainfoin; and this as early as possible. These ashes contain at least double the quantity of sulphur that is found in any other.

Two loads of soapers' ashes are sufficient for an acre of arable land; and by the assistance of this manure, the ground will not only yield a large crop, but may be sown constantly without fallowing for many years together.

[ANONYMOUS.]

Lime, like most other manures, has been used in different places, and by different persons, with various success. Lime ought not to be used alone, except where there is plenty of vegetable or animal substances for it to act upon. When these are wanting, mix it up with rotten dung; for without these it will, in many cases, exhaust the soil of its most fertile juices and particles, and leave it in a barren state. Where there is plenty of vegetable or animal substances for it to act upon, lime may be used to considerable advantage; and also on land over-run with weeds, as it kills and converts them into good manure. But on exhausted or very poor land, the expence of liming will never be repaid. In Devonshire lime is laid in small heaps on the land, then covered with



earth till the coat is thick enough to secure it from air and rain; and in order to prevent those from entering, they beat the outside of the heaps smooth with their shovels. The moisture of the earth gently flakes this lime, and the heaps remain in this state until the land is ready for its spreading.

[ANONYMOUS; *Dorsetshire.*]

"The first thing necessary on worn-out lands is, immediately after harvest, to turn them up with the plough as deep as possible. In order to do this effectually, it will sometimes be needful for a second plough to follow the first in the same furrow; which will throw the mould over, and bury the stubble and weeds. In this case there will be a new soil uppermost, which being fresh to the air, will receive much greater and more lasting benefit from the sun, the rain, and the frosts, than it otherwise could do, as thereby it will attract a greater quantity of the nutrition which these afford. The stubble and weeds, being by this method of ploughing buried deep, will much sooner rot than when just covered. In this state the ridges will lie high, and if the land be wet or of the brick-earth kind, will be full of clots or large lumps. No time should now be lost by delaying to render this newly-turned up soil as fine as harrowing can make it.

I am convinced, by repeated experiments, close observation, and plain reasoning on known facts, that lands which are made fine before the sharp frost and winter rains come on, will receive a much greater share of their influence than any other. If the land be left in a rough state, there is seldom time for the rains and frost to affect more than the outside of the large clods or lumps: the outside will indeed be pulverized, but the *middle* of the lumps, wherever they are large, will be found nearly in the same hard stiff state as when

turned up by the plough. Hence it must appear to every one, that in this case the benefit of air, winter rains, and frosts, on lands thus left, is partial; and the consequence is, that harrowing it in the spring, when these are over, is too late for its receiving the benefit which would have accrued from them, and the power of vegetation is not so vigorous.

[By ARTHUR YOUNG, *esq.*]

During my residence at North-Mims, in Hertfordshire, I kept a register of a great number of experiments and observations, which I intended afterwards to revise and publish: but in this I did wrong; for such minutes should be published while they are yet fresh in the memory, that the observations and conclusions drawn from them may be founded not only on the direct circumstances of the trial, but on the general colour of the seasons, and situation and nature of the farm. On quitting it I went directly to Ireland; and from that time till I settled in Suffolk had no leisure to look over those papers, some of which were lost in moving. But on examining them lately, I find a series of minutes of the farm-yard management, which I think ought not to be destroyed, as they contain an attempt to ascertain the expence of that manure, which has not, at least to my knowledge, yet been done; being indeed a very difficult and complex, though interesting question.

*The Manure raised in the Farm-Yard, during
the winter 1768 9.*

My stock of cattle this winter was, six horses, four cows, and nine lean hogs.—The straw, &c. for making into dung, was thirteen acres of wheat, and twelve of oats, besides which I bought eight loads of straw, and three of haulm.—I calculate that the 25 acres of corn yielded 18 loads of

straw. The whole therefore was twenty-nine loads. The cows and horses consumed 16 loads of hay.

The cows and stock-swine ran loose in the yard, and had their straw given in cribs; the stables and fat hog sties were cleaned into the yard. In May, the whole was turned over and laid into square heaps; and in June carted away. The quantity 118 loads, each 36 bushels, which is the quantity made by 45 loads of hay and straw, which is nearly two loads and three quarters of dung for one of hay or straw, and 1 loads a head for the horses and cows.

EXPENCES.		£.	s.
8 loads of straw (average 13s. 1d. per load)	-	5	5
3 loads of haulm	- - - - -	1	5
18 loads of straw	- - - - -	11	15
Labour in shovelling up the dung, and turning it		0	12
		<hr/>	
		£.	18 18

From hence it appears, that had the straw been bought merely to litter cattle with, the dung so raised would have cost 3s. 2d. per load of 36 bushels. Considering that it is on the spot, and no expence therefore of carriage in bringing it, this price I think is not dear. I would certainly buy dung so as to have it delivered at my farm. But this is not the point of view in which the 18l. 18s. 5d. should be considered; for four cows were partly wintered out of it. They ate straw the whole winter, besides their hay; this is to be reckoned at 6d. a week, or 2l. 12s. which reduces the 18l. 18s. 5d. to 16l. 6s. 5d. which is 2s. 9d. per load; a price cheaper than dung can be had in any other method.

The Manure raised in the Farm-Yard during the Winter of 1769-70.

This year the stock of cattle was seven horses, seven cows three calves, besides hogs. The straw, fern, and stubble for making into dung, was sixty-seven loads, viz.

Eleven waggon loads of fern, 16 loads of straw bought, 30 ditto the product of 33½ acres of spring corn, 10 waggon loads of stubble bought at 7s. and 22 loads of hay consumed by the horses, cows, &c.

I altered my management this year; for in August, September, and October, I carted in 59½ loads, 18 bushels each, of turf and ditch earth, which were spread over the yard, about two feet deep, except round against the buildings to the breadth of six or seven feet, which was left as a path. On this bed of earth the stables, cow-house, hog-flies, &c. were cleansed; and the cribs with straw for the loose cattle were moved about it. My design in carting this earth was to retain the urine; a small gutter which runs into a neighbouring horse-pond drains the yard: the situation is such, that I could not stop it in the way to make any use of it; and as rain will always make the farm-yard overflow, which occasions an absolute necessity to give it an outlet, I was desirous of straining it well through this layer of turf, &c. which I apprehended would retain much of the virtue of the water before it ran off. With this intention, I formed two small holes on the side of the compost for the water to drain into, and I made one of my people very often throw up all the water from those holes unto the dunghill, until no more would drain in for the present; this was repeated ~~many times~~ every week, especially when the weather was dry, ~~as then the~~ the virtue of the water is greater; the colour of it also is a good indication of the proper time to perform this operation.

The compost became by the middle of May of an uncommon size for so small a farm as mine, (only 97 acres) it was in several parts six feet thick, and in all four or five. I then set about turning it over, and mixing it well together; in doing this, I agreed with four labourers to perform that operation, and also to cart it into the fields, and spread it on

the land, I finding them two three-wheeled carts and a horse; and they to receive for the whole job a guinea per hundred loads; the carts hold 18 bushels; which was accordingly done, and the quantity was 1106 loads.

Total 1106 loads—Deduct 591—Remain 515,
Which is near six of dung for each of hay, straw, &c. Last year the proportion was 2½ at 36 bushels each, so that the quantity this year exceeds; but then the cabbages eaten in the yard are not included, which would reduce it something. For horses and cows it is seventy-nine loads each.

EXPENCES.				£.	s.	d.
Carting 591 loads of earth into yard	—	—	—	3	16	10
Team, &c. at ¾d. a load	—	—	—	1	17	0
Eleven loads of fern at 6s.	—	—	—	3	6	0
One man 6 days	—	—	—	0	7	0
Team and repairs 6 days, at 10s. 3d.	—	—	—	3	1	6
10 loads of stubble at 7s. (the price of the stubble and the chopping)	—	—	—	3	10	0
Two men at ditto 4 days	—	—	—	0	5	4
Team, &c. at 10s. 3d.	—	—	—	2	1	0
16 loads of straw at 12s. 5d.	—	—	—	9	19	0
30 ditto at 12s. 5d.	—	—	—	18	12	6
Labour in shovelling and throwing up water	—	—	—	0	17	0
[The guinea per 100 loads, for turning, filling, carting, and spreading, is 2½d. per load, which is thus divided:—						
Turning over	—	—	—	0	0	0½
Filling and carting	—	—	—	0	0	1½
Spreading	—	—	—	0	0	0½
				0	0	2½
Of this only the turning is to be charged	—	—	—	3	9	1
Total				£.51	2	4

Brought over	-	-	-	£.51	2	4
Seven cows 26 weeks at 6d.	—	4	11	0		
Three calves at 3d.	—	—	0	19	6	
					5	10 6
Total for dung	-	£.45	11	10		

1106 loads at this amount come to 9½d. per load.

*The Manure raised in the Farm-Yard, during the
Winter of 1770-1.*

This winter I proceeded in a different manner with my dung from what I had ever done before. In the summer of 1770, I was at Mr. Bakewell's, at Dishley in Leicestershire, and remarked that he piled his dung up in a clump in the middle of some of his yards; the idea pleased me the moment I saw it, and I determined to execute it upon my own farm. Mr. Bakewell uses only dung, but I thought it would be an improvement to unite my own method with this; and accordingly made a layer of hedge earth from a border that had been grubbed, two feet deep, and about twelve feet square. This was done the beginning of November. The quantity of earth 26 loads (of 16 bushels.) The yards and sheds were all cleaned on to it, which began my compost. That I might be able to make the greater plenty of dung, I purchased 43 waggon-loads of fern at 6s. a load, building stacks with it;—and I had five waggon-loads of stubble left from last year. My cattle consisted of 6 horses, 4 cows, and a yearling, besides hogs. The cows were kept tied up under a shed, and regularly littered with stubble of fern; but I should observe, that I gave them so much room that it was not necessary to clean and litter them every day, as is common; for if they are confined to a spot, they lie too dirty without it; but by giving them room to turn about, they were kept quite clean by only supplying them with fresh litter and the whole cleaned out once a week. This I did

that the manure might be the better, from receiving and retaining so much the more urine; nor did I throughout the winter perceive the cattle the least injured by this method.

I kept the yard littered about six inches deep with fern to soak up the urine, and also to be made dung by the hogs, the only loose cattle; this was cleaned up once a fortnight.

Thus the yard, the cow-shed, the hog-sties of fows and fattening hogs, and the stables, were all cleaned into three-wheeled small carts, and piled regularly on the foundation of earth, until the heap was about seven feet high; and when one was filled up, another foundation adjoining was made. And in order to make the compost the better, the flowings of the yard were partly prevented from running off, by being in one place kept a foot deep, from which they were very often thrown up on the compost with a water-bowl. This liquid was the better from my penning thirty wether sheep every night on fern in a corner of the yard; but this dung was not removed till the sheep were in May begun to be fattened. The cows were fed on cabbages and straw, and the lean hogs on cabbages alone.

[By the Rev. Mr. CLOSE.]
A TABLE for Manuring Land.

Number of heaps to a Load.	1	2	3	4	5	6	7	8
At five yards distance.	193	96	64	48	38	32	27	24
At 5½ yards.	169	80	53	40	32	26	23	20
At 6 yards.	134	67	44	33	26	22	19	16
At 6½ yards.	114	57	38	28	22	19	16	14
At 7 yards.	98	49	32	24	19	16	14	12
At 7½ yards.	86	43	28	21	17	14	12	10
At 8 yards.	75	37	25	18	15	12	10	9

Number of Loads to an Acre.

Explanation of the two first rows of figures:

The number of heaps of one load each, laid at five yards distance, is 193 to cover an acre; two heaps to a load, 96; three heaps, 64; and so on to the end. Each of the succeeding rows of figures to be read in the same manner.

[By Mr. BEDFORD, *Birch-Manor, Essex.*]

In April 1784, I manured a piece of land with malt-combs, or the dust which falls through the wires, at the rate of 4 quarters per acre, and sowed it with clover and barley. The barley was very luxuriant, and produced near 7 quarters per acre. The crop of clover was one of the finest I ever saw:

[By Mr. WAGSTAFFE.]

Being situated by a river, I had frequently regretted the quantity of weeds impeding the stream, and being the occasion of many little islands forming, which frequently in very rainy seasons caused floods and inundations, destructive of convenience, and sometimes of life. To prevent this in some measure, it is usual for the weeds in common unnavigable rivers to be cut twice in the summer months. In this practice, the occupiers of mills and of meadows are interested; the *latter* from the fear of inundations on the suddenness of heavy rains; the *former* peculiarly so to open the current, and admit the water below to pass away freely. But little care is taken to disencumber the stream, unless in some places to draw them out on the banks, where they are suffered to remain as a nuisance, without any useful or profitable application. Having frequently observed this, I determined to try their effect as a manure in their green state. I therefore tried them on some garden ground, and they ap-

peared to answer my expectation. But as this small experiment was not fully decisive, I prevailed on a neighbouring farmer to try them on one acre in a large turnip field then preparing, and on that acre entirely to omit any of the compost with which the rest of the field was manured. This he exactly conformed to, and threw the water weeds into every furrow that was at the next turn filled up by the plough. The consequence was, that by the moisture and fermentation of the weeds the seeds vegetated much sooner than on the rest of the field. They also grew quicker, and were superior both in the size of the roots and luxuriance of the leaves, so as to render the spot very conspicuous in the field; but impartiality obliges me to remark, that in the succeeding crop (barley) there was a perceivable inferiority to the rest of the land.—*Feb. 1784.*

[*By the Same.*]

Permit me now to relate a mode of more experienced advantage, which is, by extracting them with their roots, and the surface of the soil on which they grow; leaving them awhile to the action of the sun and air, for a requisite fermentation. About the middle of June, in a broad part of a stream, where from a lessened current a muddy sediment rested, and on which, in spaces, various weeds grew, but whose surface was generally covered by the river *conferva*, whose extended deep green filaments scarce left any of the other species perceptible. To draw these out, I employed two men, accustomed to the cutting of weeds in rivers, who, with paring and dragging instruments, drew out many loads in the course of the day. These, laid on a ridge, about fifty yards on the bank of the stream, were continued there about three weeks; when I had two cart-loads of this aquatic sub-

stance laid on two different parts of an inclosed piece of land preparing for turnips, in an equal proportion with stye and stable manure, spread at the same time over the remainder of the field: with another load I filled up a hollow that had been lately excavated, on which I planted turnip-rooted and Savoy cabbages; and at the same time planted some of both in a common garden soil, and likewise in some unmixed mud, where no weeds grew; drawn from the river for that purpose.

The virtue of the weed-compost is obvious in each experiment; in the last-mentioned, the Savoy exceeded in cabbage, and the turnip-rooted in leaf and bulb, others of the same species set in garden mould; while those set on the mere mud have scarcely made a progress; decisively evincing, I conceive, that the principle of increase, and progress of vegetation, are more peculiarly derived from the weeds, than from the matrice on which they grew.

In respect to the turnips, though no partiality was shewn in spreading more in quantity, in equal spaces, than of the other manures, nor were those spaces in any estimated preference as to native soil; yet are those spots distinguished by a more vigorous vegetation, and a deeper green; nor can there be found on the rest of the field (7-8ths of the whole) any roots so large as many in these small tracks.

I have carried this experiment farther, but from thence no decision can be formed, being on land newly dibbled with wheat; the probable success of which, and the more assured probability of an improvement on a barley crop, intended in succession to the turnips, I purpose to communicate when time shall give the result.—*Feb. 1788.*

[*By the Same.*]

In the course of my address I had spoken with a degree of confidence of the expected success of a barley crop, in succession to the turnips, of which I gave you an account. I have now to add, that my confidence had not betrayed me into a mistaken estimation of this new manure, as on less than one acre and three roods, I had off seventy-seven Winchester bushels of malting barley, besides three bushels of a lighter quality. The quantity of this produce may be ascribed to the general well-manuring for turnips with common dung, but on those spaces where none of that extended, a larger produce was apparent; and even on the worst part of a field dibbled with wheat, and where, from its quite opposite quality to a gravelly height on which the weed-manure was spread, half steril as this space was, were produced ears closer, larger, and with fuller grain, than on a deeper soil extended on a level round it, which had a natural advantage, and a dressing of common manure.

I have extended this river-weed compost the last season, over a piece of land sown with turnips, which appear with a superiority to others bordering upon them. Another tract of land spread solely with this compost was sown with turnip-rooted cabbage, in the manner began (I presume) and successfully pursued by Sir Thomas Beavor; these are in a prosperous state, and surpassing in size some I had on better land the preceding year, which were well manured, but not with the river compost.—The vast quantities of rank weeds and plants which abound on the banks of the numerous rivers and streams of this country, seasonably cut, and fermented and incorporated with other articles, for manure, according to the judgment and convenience of the farmer, might prove of no small national benefit.—*Nov. 1788.*

[*By a Gentleman of Pennsylvania.*]

In answer to your queries respecting *Gypsum*, or *Plaster of Paris*, I shall give as full information as I can of the success of my own and my neighbours' experiments. The best kind is imported from hills in the vicinity of Paris; it is brought down the Seine, and exported from Havre de Grace. I am informed there are large beds of it in the Bay of Fundy. It is pulverized by first putting it in a stamping-mill. The finer its pulverization the better, as it will thereby be more generally diffused. It is best to sow it in a wet day; the most approved quantity for grass is six bushels per acre. No art is required in sowing it, more than making the distribution as equal as possible on the sward of the grass. It operates altogether as a top manure, and therefore should not be put on in the spring, until the principal frosts are over, and vegetation hath begun. The general time for sowing with us is in April, May, June, July, August, and even as late as September. Its effects will generally appear in ten or fifteen days; after which the growth of the grass will be so great as to produce a large burden at the end of six weeks after sowing.

It must be sown on dry land, not subject to be overflowed. I have sown it on sand, loam, and clay, and it is difficult to say on which it has best answered, although the effect is sooner visible on sand. It has been used as a manure in Pennsylvania for upwards of twelve years.

One of my neighbours sowed some of his grass ground six years ago, another four years ago; a great part of my own farm was sown in May 1788. We regularly mow two crops, and pasture in autumn; no appearance of failure, the present crop being full as good as any preceding. I have this season mowed fifty acres of red clover, timothy grass, white clover, &c. which was plaitered last May, July, and

September; many who saw the grafs estimated the produce at two tons per acre, but I calculate the two crops at three tons. Several strips were left in the different fields without plaister; these were in a measure unproductive, being scarce worth mowing.—In April 1788, I covered a piece of grafs land upwards of two inches thick with barn manure; in the same worn-out field I sowed plaister, to contrast it with the dung. I mowed the dunged and plaistered land twice last year, and once on this; in every crop the plaister has produced the most. The plaister operates equally as well on the other grasses as on clover. Its effect is said to be good on wheat, if sown in the spring; but I cannot say this from experience. On Indian corn I know its operation to be great; we use it at the rate of a table-spoonful for a hill, put in immediately after dressing.

Experiments, with Observations on the Effects of Gypsum, or Plaister of Paris, as a Manure for Saintfoin, Cow-Grass, Dutch-Clover, &c.

No.	Gross Weight per perch, cu. ft.	Gross Weight per acre.	Net Weight, (seed deducted)	Value thereof at 1s. 6d. per cwt.	Weight per perch, cu. ft.	Measure per acre at 15 lb. per bushel.	Value thereof at 4s. per qr.	Total gross value of the acreable produce in seed and straw.
1	23	23 3 12	29 0 32	2 3 9½	2 9	2 0 2½	4 1 6	6 5 3½
2	37	52 3 12	47 2 3	3 11 7½	3 9	2 4 3	5 1 10	8 13 5½
3	31	44 1 4	40 2 24	3 10 9 7	2 8	2 0 0	4 0 0	7 1 0
4	24½	35 0 0	33 0 9	2 9 7	1 5½	1 0 4½	2 2 9	4 12 4
5	18½	26 1 20	24 0 8	1 16 0	1 8	1 1 4½	2 7 9	4 3 9
6	29	41 1 20	38 0 14	2 17 2	2 5	1 6 6	3 13 9	6 10 11
7	31	44 1 4	42 1 23	3 3 8	1 4	1 0 1½	2 0 11	5 4 7
8	13	18 2 8	17 3 27	1 7 0	0 6½	0 2 4½	0 12 9	1 19 9
9	27½	39 1 4	37 2 0	2 16 3	1 4	1 0 0	2 0 0	4 16 3

The above table is the result of repeated trials upon light loams, and poor calcareous soils, particularly chalky ones, in the years 1792, 1793, 1794, made by a gentleman of Kent.

*On the Construction of Reservoirs to preserve the Liquor
from Stables, Cattle-Stalls, &c.*

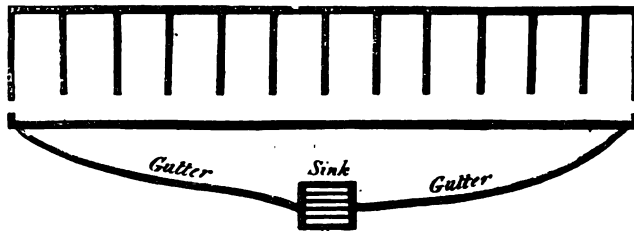
[By Mr. R. PEW.]

WITH A COPPER-PLATE.

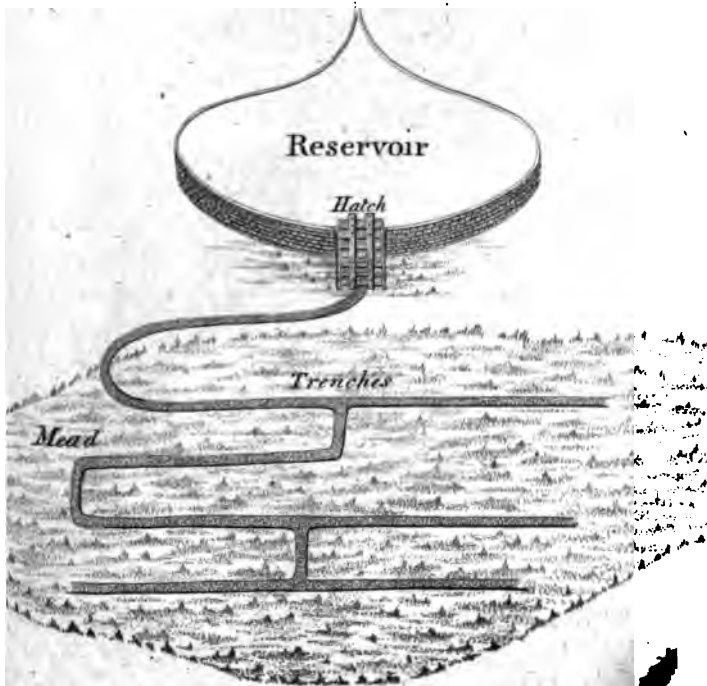
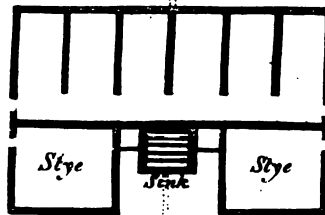
I OBSERVE the Society have offered a premium to the farmer who shall construct the best sort of reservoir to preserve the liquor from stables, cattle-stalls, &c. A farmer who is my patient, (Mr. Thomas Powell, of Semly, Wilts) taking notice of this article, took me out to see one of his, which appears to me to be upon the best possible construction, and which he is about to enlarge, with a view, I believe, to become a candidate for the premium. The rude sketch annexed, [*see the plate*] will convey a sufficient idea of his method, which the spot very much favours.

The cow-stalls stand nearly on the top, but a little on one side of a knap, and by means of gutters behind the liquor is carried into a sink which runs under the stable, where it meets, by the help of another sink, with the stable liquor; and these, together with the liquor of the pig-sties, run through an under-ground drain into the reservoir, into which Mr. Powell throws all kinds of weeds or other refuse vegetable or animal matters, where it of course rots; if the weather prove wet, he stirs it well by means of poles, then draws up the hatch, and by means of the trenches, it is conducted to all or any part of the mead below, which mead is rendered almost incredibly productive by it; and the whole is in general, at least a month before any of the watered meads I have seen, though I have occasion to go through many almost every day. If the weather prove dry, he empties the reservoir, and casts the manure at his leisure where wanted. Simple watering undoubtedly produces wonderful effects, but I much doubt if any thing equal to this; nevertheless,

Stalls for 12 Cows.



Stables for 6 Horses.



1

my neighbour Mr. West, a very observing and diligent farmer, tells me that a friend of his took the pains one year to carry out all his stable liquor alone, *without observing any good effect*, and this person knew another who had done the same with no better success. This, however, by no means proves that it may not be an excellent ingredient for hastening the putrefactive process in a compost similar to the above; and in that point of view, I cannot help thinking that the object of the Society's enquiry is fully answered, in the plan of Mr. Powell, namely, that of converting stable, cow, pig-liquor, &c. to the *most useful purposes*, and at the *smallest expence*. — May 1793.

On the Healthiness of managing Silk-Worms.

[By HENRIETTA RHODES, Bridgnorth.]

THE silk-worm in itself is totally inoffensive; but if dead ones are suffered to remain among them, they certainly become putrescent, as other animal substances, and of course unwholesome. — In the summer in which I fed upwards of 30,000 in one room, nobody was the worse for attending them; and yet I frequently spent whole days with them, as did many of those friends who were kindly attentive to assist me in the care of them. — To ascertain how much food will support a given number of worms has difficulties, since they eat much more voraciously at one time than another, and the lettuces vary materially in size.

There is a matter which appears to me of much greater magnitude, than the offering premiums for the planting of mulberry-trees; and that is, the holding forth a reward to those who shall discover the best method to propagate — All the gardeners with whom I have conversed on

are ignorant of the practice any other way, than by transplanting the suckers which spring from the roots of the old tree; and these are so few, that the expence of the purchase must deter any one from making a large plantation, whilst the use and profits of it are so precarious.—*Dec. 1787.*

On VERMIN.

BY sowing foot the mice are kept from pease and beans; and it is recommended to dip the roots of cabbage-plants wet with water in foot. Soot also, mixed well with wheat when sown, prevents the grub, and keeps off birds. Mr. Jacob, of Arne, near Wareham, speaking of rats, says, “ In the side of a bank which ran along the path-way to my barn, I observed a number of holes, in which the rats harboured and bred in warm weather. The next day making some matches with slips of brown paper dipt in brimstone, I put them into the holes—the mouths whereof I stopped, to drive the smoak inwards. After the matches were burnt out, my man opened the ground, where we found several nests, but both old and young were fled. The rats left my house, barn, and stables, directly; and for five years past have never returned. The disagreeable smell of the burnt brimstone, doubtless, occasioned their leaving the premises. I would therefore propose, that when a barn is cleared out just before harvest, a pan of charcoal be lighted up in it, and some pieces of brimstone thrown on the fire, to fumigate the whole barn. If the doors and windows are shut close, this will be done most effectually.”

[*By Mr. RACK.*]

There are few insects more prejudicial to the farmer than that generally known by the name of the *Cick-Chaffer*. In

different parts of this kingdom they are called by different names; such as the *Chaffer*, the *Cock-Chaffer*, the *Jeffry-Cock*, the *May-Bug*, and (in Norfolk) the *Dor*. When full grown in their grub-state, they are near an inch and a half long, and as big as a child's little finger. Their heads are red, their bodies soft, white, and shining, with a few hairs on the back. They have three hairy legs on each side, all placed near the head, in which are two forceps or jaws, like the hornet; with these they cut asunder the roots of grass, corn, &c. and frequently destroy whole fields in a short time. In this *eruca* or grub state, they continue three and sometimes four years. In their beetle state they have two pair of wings; the one filmy, and the other scaly. The interior pair are folded up in a curious manner, and remain hid, unless when expanded for flight. The *elytra*, or case-wings, are of a reddish brown colour, and sprinkled over with a fine white powder, like the auricula. The legs and tail (which is pointed) are whitish. The body is brown, except at each joint on the sides of the belly, which is indented with white. The circles round the eyes are yellowish; the *antenna* short, and terminated by fine lamellated spreading tufts, which the creature expands more or less, as it is brisk and lively, or otherwise. In the day-time they seldom fly about, but conceal themselves beneath the leaves of oak, sycamore, maple, hazel, lime, and some other trees, which they soon eat to a skeleton; but about sun-set they are all on the wing, and fly about the trees and hedges as thick as a swarm of bees.

These grubs generally lie near two inches below the surface, and eat the roots of the grass so regularly, that I have rolled up many yards of the withered turf as easy as though it had been cut for a garden. When they attack turnips, they eat only the middle of the small root; but by that means kill all they bite without remedy.

Neither the severest frosts in our climate, nor even keeping them in water, will kill them. I have kept some in water near a week; they appeared motionless; but on exposing them to the sun and air a few hours, they recovered, and were as lively as ever. Hence, it is evident, they can live without air. On examining them with a microscope, I could never discover any organs for respiration, or perceive any pulsation.—Hogs will root up the land for them, but first eat them greedily; but seldom meddle with them a second time. To rooks and crows they seem to be a treat. When numerous, they are not destroyed with great difficulty; the best method is to plough up the land in thin furrows, and employ children to pick them up in baskets, and then strew salt and quick lime, and harrow in. They deposit their eggs in the earth. The first year the grubs are small, and do little mischief: the second year they increased to the size of a goose-quill, and are very injurious to the herbage; the third year they attain full size, and

[By M. N.]

Pellets made of nux vomica, oil of rhodium, and meat set for rats, were eaten at first, but soon neglected; a pellet made of three parts oatmeal, and one of stavesacre, and honey, destroyed so many, that the house was disagreeable from the smell. To take them alive, they were enticed by degrees into a large box, by cheese and red herrings.

[By the Rev. Mr. SANDERS, Sidmouth.]

I made a strong decoction of tobacco and the shoots of elder, by pouring boiling water on them; and sprinkled the trees with a small hearth-brush twice a week for two or three weeks, which effectually destroyed the insects.

like was tried in the garden of one of my friends, and the leaves retained their verdure until the fall of the year. If used early, as soon as the bud unfolds itself, it will probably prevent the fly. The effect of tobacco has been long known; and elder-water, frequently sprinkled on honeysuckles and roses, has been found to prevent insects from lodging on them. All that is new in my practice is the mixing them together, and the reasons are obvious. The quantity made use of was, two gallons of water, two ounces of tobacco, and three or four handfuls of elder. It may, however, be made as strong as you please, it being perfectly innocent as to the tree itself.

Many letters have been addressed to the Society on the injury done to trees (particularly firs) by squirrels, in the woods belonging to the Marquis of Lansdown, Marquis Townshend, the Marquis of Bath, Earl of Ailesbury, Lord Arundel of Wardour, Mr. Coke, Mr. Horner, Mr. Bernard, and several others.

[By Mr. CROSLY.]

To kill slugs, take a barrel of *coal-tar*, remove a considerable quantity, so as to give space at discretion; pour on the remainder a quantity of water, and let it stand two or three days, or more; this water will be powerfully impregnated with a quality noxious to slugs, and if poured on them they will immediately die. To prevent the depredations of slugs among young plants in a garden, this gentleman recommends the scattering of this impregnated water, by means of a watering-pot, on the ground before and after sowing, at pleasure.

[*By F. FURBER, Bailiff to Mr. ANDERDON.*]

A particular worm has been found devouring the plant of wheat in many fields in the neighbourhood of Henlade. I found this worm first in half an acre of transplanted wheat about the 24th of March, which made me inclinable to search in another field the 7th of April, where the wheat plants have been going off ever since they first came up, to see if I could find out the worm there. In that field I found scores of plants totally destroyed by this worm, where I found from one to three under each plant; some part of the field was rolled the 3d of March, but the worm was just the same in the rolled wheat as in the other part of the field that was not rolled.—The worm is red, or rather of a yellow cast, and its make is about one inch long, with eleven or twelve joints, a hard shell, white within, six legs before, and one behind, with a black downy or hairy head, and two little spots on the back, near the tail part. The wheat is attacked by them under the surface of the earth, about the issuing point of the coronal root; and they do not leave the plant till all the nourishment or moisture is drawn from it.

[*By Mr. HASKINGS.*]

Having made some observations on the propagation of insects, that kind in particular of late, which often injures much of the apple blossom, has had some of my attention. The most common time for discovering this insect, and the injury done by the same, is when the other blossoms fall off for that where the insect is doth never open, but by the time the other falls off this is withered, and then has much the appearance of a brown berry; within this is the insect which, at first sight, has much the appearance of a white worm, but by minute inspection the legs and wings at the

time may be seen. It is, when thus discovered, in a suspended state; in about a fortnight after, it comes to perfection, and is then a black fly, with *hous'd* wings; it flies but little, though it walks fast; at the least touch it shrinks together, and then it has more the appearance of a spider than a fly. This insect is hatched among blossom-buds, and as soon as the leaves of the blossoms on the sides begin to loosen it forces its way in, and then, by the web it makes, or by the injury it does by feeding, or by both together, it effectually prevents the blossom from opening; that which grows within the blossom is its food, and by the time it has eaten the whole thereof, it is full grown, and then it soon becomes in a suspended state. When it first enters the blossom it is a small worm of an ash colour, with a blackish head; as it grows larger it grows whiter, and retains its whiteness until it is come near to perfection, and then in a day or two it changes from a white to a sooty black; the transfiguration it passes here is from the worm to the fly before-mentioned. To this insect, I believe, might be attributed the failure in apples, and not to blight, as stated of late in the newspapers.—I know smoke would be a beneficial remedy for this injury, provided the work be done in proper time. Whenever the blossoming season is warm and dry, a plenty of these visitants may be expected among the trees, and if any man would try the benefit of smoke, the same should be done before the blossom has swollen to any largeness, or at the furthest before it has opened; for it should be done before the fly has laid its eggs, or before the worm has entered the blossoms; as, I believe, they are not easily removed afterwards.

Those birds that feed on insects must also be useful among the trees, the most so of all these I think is the *torr-tit*; but I am aware, that here I differ in opinion from many others who are sensible discerning men;

so far from considering this little animal as a friend, suppose him to be much of an enemy, and treat him as such. If some men had seen a great number of these birds busy about the blossoms in their orchards the last blossoming season, they would readily have attributed the failure in the setting of the fruit to the injury done by them; but had there been a large number of these among the trees the last blossoming season, I doubt not but some of them would have produced double the fruit they now have. This insect is so small before it enters the blossom, that a small bird would destroy a great number of them in one day; but as the last winter has destroyed most of these birds, there has been but little benefit received from them this season. Small as this insect is, it is a very formidable enemy, the most so that I know of all the insect tribes, as it always destroys wherever it enters; nor has it ever got, neither doth it want, a second to help perform the work; for after one has entered the blossom a second never does, so that as many insects as are within the blossoms, so much fruit the less.—I here acknowledge to have held a different opinion of these birds, until of late years, and have destroyed a great number of them; but by my researches into these things, I am convinced that I was wrong. At the latter part of a mild winter, which is now five or six years since, the injury that appeared to be done to the fruit-trees by the birds was such, that the ground under the trees in my garden was almost covered with what appeared to be the broken buds; but on visiting a gentleman's garden at a little distance from mine, the gentleman observed to me, *what a fine bud there was on his trees*, and what prospect of a fine blossom; I said, in answer to him, that his trees had not received the like injury that the trees in my garden had, for I supposed that not one bud out of an hundred but had been hurt by the birds. But, to my great surprise, when the blof-

some came forth, those trees that appeared to be so injured brought forth their blossom as fine, and the fruit set as strong, as on these trees that had not the least appearance of hurt. I was for some time at a loss to account for this, but on further examination, I found it was not the bud, but a worm that we often find therein, on which the birds feed, and what appears under the trees are but the peelings thereof. These worms are hatched in the autumn, and then eat their way into the soft part of the bud, which they make their winter residence; here the small birds often seek their food in winter, and which they easily find by a small hole that is in the bud.—*Lyme, Dorset.*

[*By Mr. GULLETT, of Beerferris.*]

I have within a few weeks past opened some scores of shrivelled apple-blossoms, and scarce ever failed of finding a maggot insect (some much larger than others) safely inclosed within its natural nest; though in some instances I found it had decamped, after having exhausted its nutriment, and the decayed blossom was ready to fall off with the slightest touch.

When the winged insect tribe first begin to appear, I would recommend some heaps of the sward or long dung, wet straw, or any other like matters, at different intervals all around, *i. e.* on every side, and likewise some in different parts of the orchard; and according to the direction of the wind set fire to some of the heaps, but always on that side from whence the wind happens to blow, so that the smoke from the smothering of the heaps may blow through and fumigate the orchard for some weeks.—I have been well informed by a farmer in Devonshire, that his *fumigated* orchard had a very large and plentiful bearing of apples, which he attributes to this fumigation alone; while the *unfumigated* orchards in the neighbourhood had scarce any apples at all.—*June 1786.*

*On the Poison of LEAD, COPPER, and BRASS.**[By Dr. FOTHERGILL, of Bath.]*

LEAD in every form is unfriendly to animal and vegetable life. The miners who dig the ore, the smelters who reduce it to a metallic state, manufacturers of white lead, painters, plumbers, in a word, all who are much exposed to its effluvia, bear testimony to its pernicious effects. Its fumes are found no less destructive to domestick animals, such as dogs, cats, fowls, &c. nay, even vegetables in its neighbourhood soon lose their verdure; nor can plants thrive in pots composed of this metal. Its various preparations, as litharge, red and white lead, are all poisonous, and their activity is increased by their union with acids. And it is melancholy to consider in how many ways the poison may be taken to destroy the life of man: in oil, in wine, in rum, in cider, milk, cream, vinegar, pickles, and preserves; tea may be deleterious by being packed in lead; children's playthings are commonly painted with red or white lead; many of the paints used in water colours are poison; cosmetics are chiefly preparations of lead, mercury, or bismuth.

The method of detecting lead in liquor is certain:

Take of yellow orpiment in powder	-	-	1 ounce,
— of quick-lime fresh from the kiln	-	-	2 ounces,
— of distilled water boiling hot	-	-	20 ounces.

Let the whole stand twenty-four hours in a close vessel of glass or porcelain, stirring the mixture with a wooden spatula. Then carefully decant the clear liquor, and strain it into a bottle, which must be well secured and kept for use. Frequent exposure to air destroys its transparency.

If a few drops of this liquor be put into a glass of wine or other suspected liquor, and no change of colour, or visible

alteration ensue, be assured such liquor is free from lead, or metallick adulteration. If the liquor contain the slightest impregnation of lead, as litharge, or sugar of lead, (the substances generally employed for the purposes of adulteration) on adding the test a precipitation will ensue of a *dusky brown sediment*.—If the suspected liquor be high coloured, it must be previously diluted with treble its quantity of distilled water, or the change will not be sufficiently perceptible: and care must be taken to add deliberately from three to six drops *only*, attentively marking the alteration. A larger quantity may re-dissolve the precipitate, and soon render it invisible.—As iron and other metals may produce a change of colour and precipitation, if any doubt should arise concerning the nature of the precipitate, let a quart of the suspected liquor be evaporated in a large crucible to an extract, and afterwards calcined in a red heat. When it is cold the metallick particles may be discovered in their proper form in the ashes. Or the precipitate may be examined without a tedious evaporation, if it be placed on charcoal, and the flame of a candle be directed upon it with a blow-pipe, by which it may soon be reduced to its metallick state.—If to any medicine, perfume, or cosmetic in form of powder, liquid, or ointment, a few drops of this liquid be added, a brown colour will soon appear, if any impregnation of lead be present in the composition.—The vitriolic acid and saccharine acid may also be employed to precipitate lead from liquors, but the above test appears to me preferable to any thing of the kind yet discovered.

Smelters, plumbers, painters, and manufacturers of red and white lead should, previous to their going to work early in the morning, instead of drinking a pernicious dram, take a spoonful of castor oil, or oil of olives, and use fat oleaginous foods.

Examples are indeed too frequent of fatal consequences from foods that had received a taint from copper vessels, whether from the food being of an acid nature so as to corrode or dissolve a portion of the metal, or from the vessel having contracted a soluble rust or verdigris, by exposure to the air, or being badly tinned.

Methods of detecting this poison.—For the benefit of those persons who know the value of health, and wish to avoid the dangers that must daily await them while copper vessels continue to be employed in all culinary processes, I shall now add a few additional remarks on the principal chemical tests mentioned in the first essay, by way of illustration.

The most exquisite test of the presence of copper is the *Volatile Alkali*, or *Spirit of Sal Ammoniac*. If ten or twelve drops of this spirit be added to any liquor impregnated with copper, it instantly exhibits a blue colour, in proportion to the quantity contained. Another method is by precipitation with iron. Thus if a piece of polished iron be immersed some time in any fluid wherein copper is held in solution by the intervention of an acid, the acid, having a stronger attraction to iron, lets go the copper to unite with it, and the copper is afterwards found adhering to its surface in its shining coppery form.

For the Cure.—In about six quarts of tepid water dissolve half an ounce of any *alkaline salt*, as *salt of tartar*, *salt of wormwood*, or *pearl-ash*; or if these be not at hand, a solution of near double the quantity of common *wood-ashes*, when strained through linen, may answer the end. Let a pint of this weak *alkaline ley* be drank every half hour, with a tea-spoonful of *calcined magnesia*, till the symptoms disappear. As a considerable part of the liquor will be rejected by vomiting, this copious dilution must be resolutely pursued till nearly the whole is taken, and the poison entirely decomposed, and

washed out of the body. A pint of the *alkaline ley* may also be administered clysterwise, especially if the pain should continue; and the *magnesia* must be repeated till it has operated briskly, so as to cleanse the stomach and bowels very effectually. For while the smallest particle of poison remains unsubdued, the patient is not safe. It may not be improper to observe that the above method is not confined to *verdigris*, or poison of *copper*, but is equally applicable to other mineral poisons, as those of *lead*, *glass of antimony*, *corrosive sublimate*, *cobalt*, and perhaps *arsenick* itself.

[By Mr. HAYES, *Hampstead*.]

In almost all the great dairies, the milk is suffered to stand in lead, brass, or copper vessels, to throw up the cream. The closeness of the texture of these metals, and their coldness and solidity, contribute to separate a greater quantity of cream from the milk than would be done by wooden trundles, or earthen pans, both of which are also sometimes made use of.

I will not contend, that all the ill effects attributed to butter are caused by the mineral particles which it gains by the means above stated. I only insist that it is possible, and indeed very probable; and that it may in consequence do frequent mischief.—*Dec. 1786.*

On SPIRITUOUS LIQUORS.

[By Dr. FOTHERGILL, of *Bath*.]

UNDER the head of Spirituous Liquors may be comprehended, not only those which are in common use, as brandy, rum, gin, &c. but also the more costly compound waters, or rather spirits, as those of cinnamon, nutmegs, aniseeds, &c.—Spirits, though warranted as genuine, are,

however, frequently adulterated, and consequently render still more detrimental to those who drink them. Thus, instead of genuine French brandy, we are commonly presented with a fiery malt spirit, corrected, as it is supposed, with *aqua-fortis*. Yet with this counterfeit brandy are often prepared the famous compound waters, tinctures, and choicest cordials, so highly extolled for their superior quality.

In tracing the effects of ardent spirit on the human body we shall find that it exerts its pernicious influence first on the stomach, the inner coat of which is exposed to its full action. It soon deadens that exquisite sensibility of the nerves which gives the keen edge to appetite, so essential to digestion. But this important organ, from its intimate connection with all the noble parts, may be considered as the *key-stone* of the fabric. By gradually destroying this, it undermines the very foundation of health, and, in process of time, lets down the whole frame. The liver next becomes diseased; for on this organ it seems to exert a peculiar specific power, and by injuring its texture, it interrupts the course of the bile, and renders it incapable of performing its functions. From its action on those two important organs its effects are propagated far and wide over the whole nervous system. It not only creates maladies peculiar to itself but causes other diseases to prove far more complex, more dangerous, and more difficult to cure. Hence may be explained the nausea and loathing, the sense of faintness and debility, the sinkings, languors, and horrors, which drunken drinkers so often experience; and why they so rarely survive the attack of an inflammatory or acute disease.

A small glass of ardent spirit forced into the stomach of certain animals throws them into violent convulsions, and even a tea-spoonful injected into their veins, almost instantly deprives them of life! So immediately fatal are its effects

when applied to the naked nerves, or blood-vessels, that it may literally be pronounced a poison of the most dangerous and malignant kind ! It is abhorred by the brute creation, who all, without exception, turn away from it with the utmost disgust. It is equally detested by man in his infant state, till his appetite is depraved by evil example, and his natural aversion subdued by the all-conquering power of habit.

It is with peculiar concern, however, that we find so many instances of it even among the female sex, who, from being once the patterns of temperance, and every thing that was amiable, are now reduced to infamy and contempt ! A circumstance not less frequent than deplorable, especially among the lowest order of females !

Habitual dram-drinkers are not only short-lived, but contract a variety of diseases which embitter all the enjoyments that render life desirable. To enumerate their manifold sufferings would require a volume ! Suffice it to observe in general, that the liver being obstructed, and the constitution enfeebled, they commonly first fall into a jaundice ; this gradually slides into a confirmed dropsy, and this at length closes the fatal scene ! Some few, who escape the jaundice or dropsy, contract gout or stone, while others are taken off by apoplexy, palsy, or insanity ! For this poison, whether quick or slow in its operation, is always *sure* at the last.

Wine, beer, and other fermented liquors, drank too freely, produce extravagant mirth and gaiety, ending at length in drowsiness and stupidity. Spirituous liquors tend to inspire the more angry and morose passions, which often terminate in fury and outrage. The former brings on intoxication in a more slow, gradual manner ; the latter seizes the brain almost immediately, without leaving time for recollection.

Hence double-distilled spirits, through ever so genuine in their kind, are more suddenly destructive than the weaker

proof spirits. This potent poison, when taken in excess, soon deprives men of their reason, the only faculty that elevates them above the brutes. It overthrows memory, judgment, and all the intellectual powers, introducing a temporary frenzy, or savage madness, which sinks them beneath the lowest of the brutal tribe. For it suddenly converts a rational inoffensive being into a fury, ripe for every species of mischief and extravagancy, which in his cooler hours he would contemplate with horror and amazement. It prompts him to wreak his vengeance indiscriminately, whether on his companions, or on glasses, furniture, and other inanimate bodies. As soon as this fit of frenzy subsides, stupefaction ensues; when he sinks down into a state of total insensibility, during which the mind remains a complete blank. What a humiliating spectacle is here! How fit to inspire compassion, contempt, resentment, and horror! Well might the Spartans exhibit their slaves in this terrible state of disguise, the more effectually to deter their sober youths from drunkenness. For in this unfortunate condition, man, lately the sovereign among the creatures, is suddenly transformed into the most helpless, odious, and disgusting animal in the creation!

The advocates for strong liquors would endeavour to persuade themselves that spirits are not only useful, but absolutely necessary to fortify the system against the vicissitudes of our climate, and also to enable it to undergo hard labour. That this, though plausible, is a vulgar and dangerous error, is evident from numerous examples, not only among those of our own countrymen, who drink nothing but water, but also of entire nations who never taste spirits, and yet enjoy health and vigour in a super-eminent degree. At Constantinople, where the use of strong liquors is wisely prohibited, the Turkish porters, whose only liquor is water or lemonade,

are observed to perform their laborious task with alacrity, and with firm step to sustain burthens under which our dram-drinking porters would reel and stagger. The brave soldiers under the Roman Republic, whose drink consisted of vinegar and water alone, traversed various climates in marching and fighting beneath a heavy load of armour; yet they nobly sustained their fatigue, and even conquered the world, without the miserable aid of spirituous liquors. But it is observable, that when afterwards they became enervated by luxury and intemperance, they fell in their turn, an easy prey to the more rude and barbarous nations.

What has hitherto been advanced against the general *abuse* of spirits, is not to be understood as applicable to their *use*. Nor is it so much my object to move the passions of my readers, as to convince their judgment. According to its use, a *poison* may be converted into a *medicine*, and a *medicine* into a *poison*. Genuine spirit, when converted into punch, affords a generous cordial, and is certainly preferable to the adulterated wines that are but too commonly vended. Here, the spirit properly diluted with water, and tempered with a due proportion of the acid of the fruit, and the whole perfectly combined by the intervention of sugar, loses its fiery quality, and becomes a *new* liquor, not only more palatable, but abundantly more wholesome, than when merely dashed with water alone. On urgent occasions, therefore, and where such a cordial seems to be really wanted, as when a person has long been exposed to cold tempestuous weather, or exhausted by sickness, or bodily fatigue; a few glasses of warm punch may not be improper, to prevent a greater evil. —“*Give strong drink,*” says King Solomon, “*only to him that is ready to perish.*”

*On the Preservation of the Health of Persons employed
in Agriculture.*

[*By Dr. FALCONER, of Bath.*]

THE regular hours necessary to be observed by those who follow country business are perhaps of more consequence than any of the other articles, however important those may be. It is an old and a common opinion, that the external air is much less salubrious during the night than the day; and this opinion, which probably was at first drawn from observation, seems to be confirmed by chemical experiments, which tend to shew that the air exhaled by vegetables, while the sun is above the horizon, is much more pure and fit for respiration than that which issues from them in the absence of the sun. The ill effects of the latter are probably best avoided, by the human body being in a state of repose and insensibility, which render it less liable to be affected by such impressions.

The life of husbandmen and farmers, though in general healthy, has, like other situations, some circumstances attending it which produce disorders. First, the nature of their employment often exposes such persons to the vicissitudes of weather, as cold, heat, and moisture; to which may be added a combination of the last of these with either of the former.

Exposure to a great degree of cold may produce the inflammatory fore-throat, rheumatic pains in the teeth and face, inflammations of the eyes, and coughs, with pain of the breast, attended with fever, and rheumatisms acute and chronic. Cold, likewise, when great and long continued, is apt to produce paralytic affections, especially in the lower extremities, which are generally most exposed to its influence.

Inflammatory fevers are often the consequence of heat and labour, and sometimes such as are attended with local inflammation, as pleurifies, peripneumonies, inflammations of the bowels, &c. Sometimes the brain is primarily affected, probably from the immediate effect of the sun's rays upon the head. People who work in the open air, and oftentimes at a distance from shelter, must necessarily be exposed to casual showers at every season of the year. The evaporation of the moisture generates a degree of cold, which is greater as the evaporation is quicker. This then is one reason why the danger of wet clothes is greater, as the body is more heated.—The draining of marshy grounds, however it may in its consequences benefit the health of those who live in the neighbourhood, has been long observed to be but an unwholesome employment for those who work at it. Putrid complaints of various kinds may be produced by these exhalations, but I apprehend the intermittent fever is the usual consequence; the frequent appearance of which, in moist and fenny countries, has been universally observed.

It is no uncommon thing for people who work in harvest, when violently heated by the weather and by labour, to drink large draughts of some cold thin liquor, as water, milk, whey, butter-milk, and such like. This, if taken in great quantity, has been sometimes known to suppress the powers of life altogether, and produce an almost instant death. It is not uncommon for a violent fever to be the consequence, which is frequently attended with inflammation of the stomach or bowels; both which are disorders of the most dangerous nature. But should they escape incurring any acute complaint, it is common for them to be affected with a sense of weight and sickness at the stomach, which continues several weeks, and is at last relieved by vomiting; this, however, does not put a period to the complaint, as it is gene-

rally followed by an itching eruption on the skin in blotches in various parts of the body, which proves to be the leprosy—a loathsome and filthy disease, and very difficult of cure.

Labouring persons are very apt, when they leave off any work in which they have been much heated, to remain some time at rest in the open air before they put on their clothes. This is a very imprudent practice, and frequently produces bad effects, especially in bringing on coughs, and other disorders of the breast, which oftener owe their rise among the common people to this than any other cause.

Neglect of changing their clothes when wet is also a great source of disorder among husbandmen.

Excess, or irregularity in Diet, is another source of disorder to people in this way of life. This is common in some measure to all ranks, but in several respects it is particularly applicable to those who are employed in husbandry. The diet of people employed in husbandry does not admit of much luxury respecting its quality; there are, however, some things which come within the reach of these people, and which they regard as gratifications, and of course are apt to take in too great quantity. Of this kind are some of the autumnal fruits, which in some years are produced so largely as to be of scarcely any pecuniary value. Of these, plumbs especially such as are of the coarser and more austere sorts are the principal. It is a common observation, that in years wherein there is an abundance of such fruits, purgings, colicks, and most other complaints of the stomach and bowels are very common. It is proper here to observe, that the incautious manner in which these fruits are devoured, especially at their first coming in, causes many of the stones to be swallowed—a practice extremely hazardous. Sometimes when the accumulation of them has been considerable, they have obstructed the alimentary canal altogether, and pro-

duced a miserable death in a short time; at others, they have made their way through different parts of the body, and caused either a long and painful illness, or death, by the hectic fever attending internal suppurations. Pears, if eaten too freely, are apt, as well as the stone-fruits, to disorder the stomach and bowels; but they are less dangerous, and not so often swallowed in such quantities as to be materially prejudicial to life or health. Nuts are perhaps, upon the whole, the most dangerous of any of the fruits that are likely to fall into the way of this rank of people. When eaten in large quantity, they have been often known to lodge in the stomach, and to be incapable of being removed from thence by any medicine, and of consequence have put a speedy end to life. When taken in less quantity, they are found to oppress the breathing, and to produce vomiting and bowel complaints.

The bursting of some of the blood-vessels, particularly those of the head, lungs, or stomach, nephritic complaints, and intestinal ruptures, have all of them followed ill-judged and ostentatious displays of strength and corporeal abilities.

Warmth of clothing is the only method, exercise excepted, by which those who spend their life in the open air can guard against cold, and nothing is more necessary for such persons as are the subjects of the present consideration, than a proper regard to this article. Friction, properly applied, might prove an excellent preservative against, and even a remedy for many of the bad effects of cold. Would persons chilled with the severity of the weather, rub their bare limbs with woollen cloths for a considerable time after they return home, it would produce a more equable and genial warmth, and contribute more to support the powers of life, than any artificial heat whatsoever. Should any persons in extreme frost have their limbs or any part of the body actu-

ally frozen, the utmost caution must be had not to bring them near to any fire. The safest method is said to be, to rub the part frozen first with snow, and to continue the friction till some degree of warmth begins to appear, but not to suffer the access of any heat from fire, till the warmth from friction takes place. Even then, the part frozen should not be suddenly exposed to the heat of a fire, but rather be continued to be rubbed till the natural sensation and heat are perfectly restored. If the part frozen be exposed to the heat of a fire whilst in a frozen state, it will undoubtedly mortify.

Heat, though less frequently an object of our care in this respect than cold, nevertheless demands our attention; though seldom of long duration, it is sometimes excessive. As the head is the part principally exposed to the action of the solar rays, it is particularly necessary to use some defence for that part. Hats are used for this purpose, but the black colour of which they are generally made, causes them to absorb the heat, and of consequence to accumulate it in the very part on which we should least desire it to fall. Hats for working people in hot weather should be made of straw, or some light substance of a white or pale colour, and with brims sufficiently wide to shelter both the head and shoulders from the scorching beams of the sun. Even a piece of white paper covering a hat is no contemptible defence against solar heat. The mischievous consequences of cold liquors, drunk in such cases, are much aggravated when they are (as is too common) swallowed down in enormous draughts. Another caution highly necessary for such persons is, to put on their clothes immediately on their leaving off work, and to do this without any regard to the warmth of the weather.

Moisture is equally necessary to be considered in this place, with respect to its effects on the health, as *heat* and *cold*. This, I have observed, cannot be always avoided, but the

bad effects it sometimes produces may generally be obviated. If those who are wet with showers, would be careful to continue their motion and labour whilst they remain in the open air, and to change their clothes on their return home, many of the bad consequences of wet clothes would be prevented. Friction on such occasions might be an excellent preservative against the bad effects of cold and moisture; were the body and extremities that have been so exposed, rubbed strongly for a quarter of an hour with a coarse woollen or linen cloth, immediately on the wet clothes being stripped off, it is probable few bad consequences would follow from the accident.—Draining marshy ground is a necessary business, and, as I have before said, exposes the workmen to hazard from the nature of the moisture, as well as from simple humidity. The intermittent fever is the principal, though not the only complaint, work of this kind is liable to bring on, and must be particularly guarded against. It therefore seems proper that such kind of work should, if possible, be performed in the spring, or early in the summer, in which seasons these disorders are not so likely to happen as when the autumn is advanced; and those who work in this way should be sufficiently clothed, and be very cautious to avoid sudden transitions from heat to cold.

Intemperance is particularly dangerous under such circumstances. It is highly proper, and even necessary, that those who perform such kind of labour should have a sufficient, and even liberal allowance in point of diet; but excess of any kind, in spirituous liquors especially, tends to weaken the stomach, and in consequence thereof, the whole vital system, and to render the body more liable to receive contagion of every kind. None should go to such kind of labour in the morning before they have taken some kind of food; somewhat warm is most proper, and I should prefer animal food.

Cleanliness is an essential article in such circumstances. Would those who work at such employments, be careful to wash their hands and feet at their return from work, and to change their linen and stockings as often as their circumstances would admit, it is probable that the hazard would be greatly lessened.

Excess, or Irregularity in Diet, is the next subject of these cautions. It is certainly mean to offer to entertain any persons, of whatsoever degree they may be, without producing a sufficient quantity of wholesome provisions; but it is still more inhospitable to encourage any to make such an use of what is provided for them, as to endanger health or life, not to mention the scandalous waste which must be caused by it. Still more blameable is the practice of encouraging gluttony by wagers or offers of reward.

Fermented liquors, taken in moderate quantity, are both proper and necessary for those who perform laborious work; but this healthy proportion is apt, when opportunity offers, to be exceeded by people whose gratifications are few in number, and of rare occurrence. As it is impracticable to prevent such excesses altogether, I would wish to suggest, that if they must take place, malt liquor is found by experience to be much less injurious to the health and constitution than distilled spirits, however diluted with water.

I have mentioned that ill effects follow violent exertions of labour or exercise, and shewn the imprudence of such strained efforts. I shall only add here, that such trials should not be encouraged by premiums or other means.

Good plans for farm-houses of different sizes, according to the number of inhabitants, would contribute in no small degree to general welfare. The bed-chambers in farm-houses are in general too low and confined, and the whole building too small; this occasions too many people to be

crowded together, a circumstance always very unfavourable to health, and the most common source of contagious disorders. Good water is also a circumstance of great moment.

Persons employed in daily labour of a healthy kind, and living on coarse food, naturally become robust and athletic, of a firm fibre and dense blood. Hence inflammatory complaints are in such habits more common than those of the putrid kind. Bleeding in the fevers that occur among country people, is for the most part necessary, especially in such as are attended with local inflammation, as pleurisy, peripneumony, or inflammation of any of the viscera. In such cases, twelve, fourteen, sixteen, or even twenty ounces of blood, may, and often ought, to be drawn at one time. The quantity, however, cannot be determined by any general rule, but must be regulated by the age, strength, sex, and constitution of the patient, but principally by the urgency of the symptoms. The intermittent fever sometimes comes on with such violent symptoms as to resemble very strongly an inflammatory fever. But a little time generally resolves the difficulty, and the successive and clear marked stages of *cold*, *heat*, and *sweat*, are for the most part sufficient to determine the nature of the disorder, even before any intermission takes place, and any necessity of beginning to treat it as a fever of a different kind. Even if it should be mistaken, and some blood drawn, this evacuation has been often found serviceable in the beginning of intermittents, when the symptoms are violent, and is recommended on such occasions by the most judicious practitioners.

It is an opinion generally received, that if bleeding be omitted at the beginning of fevers, it is improper in their advanced state, and this is in some measure true. Fevers that commenced with inflammatory symptoms, often become putrid as they proceed, and bleeding is certainly improper in

such circumstances. But I would observe, that this ca holds more strongly with regard to the enfeebled inhabitants of towns, than for robust country men. Topical bleeding is often of great service in many disorders, as well as general bleeding, especially in the removal of some troublesome distressing symptoms. The head-ache is frequently attendant on fevers, and often continues when the heat, quickness of pulse, thirst, and other symptoms, are much abated and may be often relieved by leeches applied to the temples.

The ulcerated fore-throat is another complaint that may be found in every situation, as it is capable of being propagated by contagion. The difference of this from the inflammatory fore-throat is now well understood and generally known; but there is another complaint that resembles very much, which requires a very different mode of treatment, of which I shall speak hereafter. In both, however, bleeding is improper. No case requires the use of the lancet more than the common cold, if attended with cough and pain of the breast or side. These symptoms, if neglected frequently terminate in consumptions, which might have been prevented by some evacuation of this kind, just in time to common care, while the complaint was recent.

All purgatives evacuate the bowels, and, if powerful and stimulating, produce a watery discharge by the absorption they occasion from the lymphatic system. Notwithstanding this similarity in the effects of purgative remedies, they differ considerably with respect to the circumstances that attend their operation. Some purgatives are observed to stimulate the body and accelerate the pulse during their operation more than others; and this is an important circumstance directing our choice of them, according to the purposes which they are intended. Those that operate with less irritation to the system, especially to the circulation, are

ferable in acute complaints; and nothing in such cases is better than a simple solution of the bitter purging salt in water. It is seldom rejected by the stomach, and its operation is effectual and takes place quickly—a circumstance of great importance in such cases. From one to two ounces may be safely taken, dissolved in a pint of warm water, in all inflammatory complaints where purging is proper.

It is of the utmost consequence to mention, that when any complaint of violent pain in the stomach or bowels is made, especially if such pain be not accompanied by stools, we should enquire first about the place in which it is chiefly felt, if that can be pointed out; and next, if it came on rather suddenly, or soon after performing some laborious work, especially the lifting any great weight, or indeed any considerable exertion of strength. If this be found to be the case, we should carefully examine the belly, especially that part nearest to the seat of the pain; and if any swelling or lump, however small, be found, even of the size of a hazelnut, we may be almost certain, that the cause of the complaint originates from thence, and that if it be *immediately* attended to, it may *probably* be relieved, at least the present danger obviated; but that if it be neglected, the patient will almost infallibly die. The only remedy on such occasion is, to restore the portion of the intestine, which is thus protruded and compressed between the muscles of the abdomen, again into the cavity of the belly; and if this be done *soon* after the accident, it produces no farther injury. The apparent facility and celerity with which this operation is often performed, and its great simplicity, may induce some to attempt the performance of it, who have had no instruction or experience relative thereto; but it is proper to caution against such attempts, as much nicety of touch, and address of management, are often requisite; and if the part be rudely or

injudiciously handled, the hazard of the disorder is increased. —Emetics are indicated in cases where from imprudence or negligence any thing has been swallowed, that we have reason to believe would be specifically injurious by its continuance in the stomach. Thus if any poisonous plant, root, or berry, as of henbane, dropwort, nightshade, or such like, has been incautiously or ignorantly taken, our principal security depends on such poisonous substance being evacuated as soon as possible, and this can only be done with safety by means of emetics. A scruple or half a drachm of powder of ipecacuanha, together with a grain of emetic tartar, may be safely given on such occasions to an adult person, and worked off with a strong infusion of chamomile-flowers, or of root of horse-radish. —About ten years ago, a disease appeared in the Midland counties, much resembling the ulcerated fore-throat, but differing from it in reality, and requiring very different remedies. This was called the sore throat, attended with scarlet fever, and raged principally in the summer and autumn, in hot and dry weather, and attacked principally robust and vigorous people. Vomiting in this disorder proved a very effectual remedy, and required to be frequently repeated during the heat of the disease, even (in bad cases) as far as twice in twenty-four hours.

Medicines that cause sweat, called *Diaphoretics*, are next to be considered. The use of these, though not so general as was formerly thought, still forms an important indication. The common catarrhus cold is more effectually relieved by promoting this evacuation than by any other means, and the same was observed of the influenza, when that complaint was epidemic some years ago.

In rheumatic cases, it may be necessary to employ diaphoretics of a more powerful kind, and for this purpose *Dover's Powder* is frequently given, and often with good effect. It

is given from five to fifteen grains, and may be continued every night or every other night, for ten days or a fortnight, if the discharge by the skin be not too great, and the painful symptoms continue.

It is proper here to speak a few words on the subject of that popular remedy, *Dr. James's Fever Powder*. This is well known to be an antimonial composition, less stimulating to the stomach and bowels than emetic tartar, and on that account preferable where any permanent effect is desired. It often acts as an emetic or purgative, as well as a diaphoretic; but the last effect is, I think, more common. In fevers of the inflammatory kind, and such as are commonly found in country places, it is, if given with any tolerable caution, an excellent remedy, taking off the feverish spasm, unloading the stomach and bowels, and as it were giving an opportunity for the exertions of nature. It is best given at the beginning of feverish complaints, before they alter their tendency from an inflammatory to one that is putrid.

Diuretic Medicines form a class of remedies, whose effects would be very desirable, were they not so precarious.

Stimulant Medicines may be considered in practice as of two kinds; one of which tends to give a permanent support to the vital powers, the other tends to excite their action in a more temporary manner. Of the former of these, wine, when good, is perhaps the most generally useful in cases of emergency. It is now found that in low and putrid fevers, wine may be given with great advantage in larger quantity than was formerly thought practicable with safety, even to two or three bottles in twenty-four hours. In fevers, where the skin is moist, with a scalding heat to the touch, the pulse quick and low, the eyes moist or watery, the stools loose and foetid, thirst great, tongue foul, respiration difficult, and spirits depressed, there the use of wine is advisable, and

is indeed the principal remedy on which we must depend. The indication for wine is stronger, if any spots of a blue or purple cast appear on the body, or if a low muttering delirium come on, attended with faintness; life then depends on active and quick exertions. If wine cannot be had, or not in perfection, or is not relished by the palate, good malt-liquor may be substituted in its room; and I have seen porter tried with the best effect in a case of this kind.

The principal use of the *Peruvian Bark* is in the intermittent fever, the returns of which it is well known to be very efficacious in preventing. It is best given in substance, and most conveniently in form of an electuary made up with any syrup, and with the addition of some spice, as a little nutmeg or cinnamon in powder, to each dose.—*Bitter Medicines*, such as the flowers of chamomile, roots of gentian, and centaury, are in a good measure similar in their effects to the Peruvian bark. They are, however, less effectual in the cure of intermittents, and disorders of a putrid tendency, but better suited to a weak state of the stomach and organs of digestion.

Stimulant applications of the *external* kind are next to be considered. The principal of these are *Blisters*. The stranguery sometimes follows the application of a blister. This, however, though troublesome, is seldom of any serious consideration, as it is mostly relieved by drinking plentifully of any mild warm diluting liquor, as milk and water, infusion of linseed, solution of gum arabic in an infusion of the root of marsh-mallows, and such like.

Medicines that ease pain, and procure rest, are the next to be considered; these are of several kinds, but *Opium*, by its greater efficacy, and more convenient exhibition, has superseded in a great measure all the others. Did opiates produce no other effects than those above ascribed to them, it would be

be unnecessary to give any directions relative to their use, farther than to determine the proper dose; but the operation of this remedy is not so simple, but requires attention to regulate, and in some instances to counteract, some of its effects. Opium may be safely and properly administered in most cases of violent pain, attended with none, or but little fever or inflammation. Thus it is the principal, and indeed almost the only, remedy to be depended on, in those dreadful fits of pain which often attend the passage of a stone or gravel through the urinary passages. In such circumstances, opiates may be given with considerable freedom. The use of opium is in no instance more strongly manifested, than in the violent purging and vomiting that often comes on towards the latter part of the summer, or during the autumn, and is called the *Cholera Morbus*. Opium is likewise proper in the simple diarrhoea, or purging, that often comes on towards the close of summer. Opiates, judiciously administered, might often prevent many of the bad consequences that follow violent colics, the iliac passion, and inflammation of the bowels.

With regard to the *treatment of Sick Persons*,—*Cleanliness* is a matter of the greatest consequence to the cure both of acute and chronical disorders. *Change of Air and Coolness* are nearly connected with cleanliness, and equally necessary to be attended to. *Quiet* is another important article. Officious curiosity is apt to make many persons intrude upon sick people, who have very little real concern upon their account. This should by all means be discouraged, and no more persons admitted to the chamber of the sick than are necessary to attend him. The admission of others tends only to foul the air, increase the heat, and prevent the rest of the sick.—The support of the spirits of a person labouring under disease is as necessary towards his cure as the

administration of medicines. Every person that is ill, should be comforted with hopes of recovery, and cheerful prospects of life. To foretell a person's death in his presence, who is then ill of an acute complaint, has no small influence in verifying the prediction. Even those whose profession leads them to recommend religion to others, should be careful of dwelling too much upon gloomy subjects, and giving people dispiriting ideas of their situation.—Repentance and amendment of life are no doubt in many instances necessary to be advised, but great care must be taken to administer, together with advice, that greatest of all cordials—*Hope*.

On the HYDROPHOBIA.

[*By Count BERCHTOLD.*]

IT has been mentioned, in the *Gazettes* of *Hamburg* in the year 1792, that Dr. Loof, an English physician, formerly established in *Holland*, has saved the lives of several people bit by mad-dogs, by giving them inwardly *pure olive oil*, made into a jelly, by mixing it in a clean earthen vessel with the yolks of two or three eggs on a slow fire, and stirring it continually. Weights not always being at hand, when such an accident happens, the quantity of olive oil, which is to be used each time, has not been yet determined by the weight, it has been said only, "Break the shell of an egg in two, and fill one half of it with pure olive oil."

Dr. Loof orders to give this remedy *two days successively*, and *commencing as soon as possible*, observing, at the same time, *to keep the stomach empty six hours before, and as many hours after taking the medicine.*

The wound must be *kept open* during nine or ten days, and be *anointed every day with the medicine* described.

Several dogs have also been cured by taking a *double quantity* of the same remedy, which threw them into a most abundant and fetid sweat, and occasioned a very considerable loss of hair. Wherever the dogs rubbed their bodies against the white wall of the stable they have been confined in, a spot has been left, which penetrated so deep into the wall, as to render it very difficult to scratch it away.

During my stay at Palma, the capital of the island of Majorca, I mentioned Dr. Loof's remedy to the governor of the place; and he told me, that he knew of it, and that it has also been used with success at Madrid.—*Sept. 1798.*

[*By Dr. FOTHERGILL.*]

When the canine poison is first introduced into the human body by a wound, or a small scratch, as in inoculation, it betrays no sign of acrimony, nor of an actual venomous quality. No violent inflammation, or swelling of the lymphatic gland above the part affected, ensues, but the wound heals as kindly as any common sore. There it lies dormant an indefinite space of time, most commonly about six weeks, sometimes eight or nine months; and in some rare instances even eighteen months; till at length, when the accident is perhaps forgotten, it suddenly becomes active, produces a sense of pain, tingling, or numbness in the part, the first har-binger of impending mischief. To these succeed inquietude, restlessness, and an uneasy sensation about the throat: next follows, accompanied with tremendous spasms, and arrayed in all its terrors, that awful symptom the Hydrophobia, which generally, on or before the end of the fourth day, completes its fatal career!

Other animal poisons, as that of the syphilis, or small-pox after inoculation, can be traced in their course to the

the next lymphatic gland, a circumstance not observable concerning the canine poison; which, if it be absorbed at all, remains at least perfectly inert, without discovering any testimony of its presence till the moment it becomes active in the part, when it soon proceeds to discover its specific effects. Till then there is no disease, only a pre-disposition, which requires an occasional cause to bring it into action. Thus the poison, after remaining latent nine or ten months, has been suddenly roused into activity, by a bruise or injury of the part, by intoxication, passion, &c. While some persons are extremely susceptible of the infection, others are almost proof against it, like those who have been repeatedly inoculated without effect. The long space that intervenes between the time of receiving the bite and the appearance of the disease, happily affords a very favourable interval for eradicating the poison, which, during its inactivity, may be safely considered, I presume, as entirely local. Other animal poisons infect almost every person in whom they are inserted—this happily but few. Of 120 persons bitten by supposed rabid animals, it has been asserted that only about 1 in 16 contracted the disease. Others, however, have calculated, that the average number may be at least 1 in 10 or 12; and M. Bibiere assures us, that out of 17 persons bitten by a mad wolf, 10 were infected. This, however, will vary according to the activity of the poison, the certainty of its insertion, the state of the body, and whether the bite be received through clothes, or the naked skin.

The poison being generated in the canine species only, as dogs, wolves, foxes, &c. it is no wonder that they appear to be more susceptible of the poison than man. Thus Dr. Hamilton informs us, that four men and twelve dogs were bitten by the same dog; the men escaped the infection, but the dogs all died mad.

[*By Mr. MEYNELL.*]

The first symptom of canine madness in dogs is, I believe, a failure of appetite in a small degree. I mean, that the dog does not eat his usual food with his usual eagerness; though, if better food be offered him, he may eat it greedily. A disposition to quarrel with other dogs comes on early in the disease. A total loss of appetite generally succeeds; though I have seen dogs eat, and lap water, the day before their death, which generally happens between seven and ten days after the first symptom has appeared. A mad-dog will not, I believe, cry out on being struck, nor shew any sign of fear on being threatened; though he will, very late in the disease, appear sensible of kind treatment.

I have never known a mad-dog shew symptoms of the disease in less time after the bite than ten days; and I have known many instances of dogs having died mad as late as eight months after the bite. I think the symptoms generally appear between three and eight weeks after the bite.

A mad-dog, in the height of the disorder, has a disposition to bite all other dogs, animals, or men. When not provoked, he usually attacks only such as come in his way; but having no fear, it is peculiarly dangerous to strike at, or provoke him. Mad-dogs appear to be capable of communicating the infection early in the disorder, and as soon as they begin to quarrel with or bite other dogs.

The eyes of mad-dogs do not look red or fierce, but dull; and have a particular appearance, which is easily distinguished by such as have been used to observe it; but not easy to be described. Mad-dogs never bark, but occasionally utter a most dismal and plaintive howl, expressive of extreme distress; and which those who have once heard can never forget. So that dogs may be known to be going mad without being seen, when only this dismal howl is heard.

Mad-dogs do not foam or froth at the mouth, but their lips and tongue appear dry and foul, or slimy.

Though mad-dogs generally refuse both food and drink in the latter stage of the disorder, yet they *never* shew any *abhorrence* or *dread of water*, will pass through it without difficulty, and lap it eagerly to the last. But it is remarkable, that though they lap water for a long time, and eagerly, and do not seem to experience any uneasiness from it, yet they do not appear to swallow *a single drop* of it; for, however long they may continue lapping it, *no* diminution of quantity can be perceived.—I am persuaded, that this disorder never originates from hot weather, putrid provisions, or from any other cause than the bite. For however dogs may have been confined, however fed, or whatever may have been the heat of the season, I never knew the disorder commence without being able to trace it to that cause; and it was never introduced into the kennel but by the bite of a mad-dog.

The hairs of a mad-dog do not stand erect more than those of other dogs. I do not know that there is any thing remarkable in the manner of a mad-dog's carrying his head, or his tail. I do not believe that dogs are more afraid of a mad-dog than any other dog, that seems disposed to attack them.

There are two kinds of madness, both of which I have known to originate from the bite of the same dog. Among hunters, one is known by the name of *raging*, the other by that of *dumb*, madness. In *dumb* madness, the *lower* jaw drops and is fixed, the tongue hangs out of the mouth, and *saliva* drops from it. In *raging* madness, the mouth is shut, except when the dog snaps or howls, and no moisture drops from it.—Sept. 1798.

On TREES and TIMBER.

[*By Mr. MARSHAM, in a Letter to Sir T. Beevor.*]

I HERE send you the measures of some of the largest trees, taken by myself, in several rambles about the kingdom. —Here to save repetition, 5 feet is the height I always measure at, as easier to see the level of the string, and also being clearer of the swellings of the roots.

In 1759, the oak in Holt-Forest, near Bertley, was at 7 feet, 34 feet. There is a large excrescence at 5 and 6 feet, that would render the measure unfair. In 1778, this tree was increased half an inch, in 19 years. It does not appear to be hollow, but by the trifling increase, I conclude it not sound. —The Fairtop oak in Epping-Forest, seeming found in 1754, and the Earl of Thanet's hollow oak, in Winfield-park, in Westmoreland, in 1765, were both 31 f. 9 inches. —The handsomest oak I ever saw was in the Earl of Powys's noble park by Ludlow, in 1757, though it was but 16 f. 3 inch. But it ran quite strait, and clear of arms, I believe, full 60 feet, and had a large and fine head. —In Benel church-yard, three miles north of Dunbarton, in Scotland, in 1768, a very flourishing ash, 16 f. 9. inch. —In 1754, a fine Wych elm by Bradley church, in Suffolk, 25 f. 5½ inch. In 1767, this tree was 26 feet 3 inch. Increased 9½ inches in 13 years. —I have a hollow Wych elm by Stratton church, at 4 f. 29 f. 6 inch. ; and I had in 1760, in my old park in Hevingham, a headed alder, at 4 feet, 19 f. 2½ inch. —In 1755, your hawthorn, by Hethel church, was at 4 feet, 9 f. 1½ inch ; and one arm extended above 7 yards. —The tallest trees that I have seen were Spruce and Silver firs, in the vallies of Switzerland. I saw several firs in the dock-yard in Venice above 40 yards long ; and one of 39 yards was 18 inches diameter at the small end. I was told they came from Switzerland. —Lord Petre's

old park, at Writtle in Essex, in 1764, I found a hornbeam above 12 feet; and the old chefnut, (very hollow) at $3\frac{1}{2}$ feet, the least part 42 f. 5 inch.; at 5 feet, 46 f. 1 inch; and at 6 feet, 49 f. $5\frac{1}{2}$ inches.—In 1759, the chefnut in Lord Ducie's garden, at Tortworth in Gloucestershire, was at 6 feet, (the lowest I could measure it, as the garden-wall joins to the tree on two sides) 46 f. 6 inch.; it did not appear hollow, but had very few and small boughs: as I took the measure in a heavy rain, and did not measure the string till after I returned to the inn, I cannot so well answer for this, as the other measures.

I have seen a memorandum of a former rector of Hevingham, wherein is written, that "in 1610 he planted two " chefnuts by his church porch;" the largest was, last autumn 1778, 14 f. $8\frac{1}{2}$ inches, or $176\frac{1}{2}$ inches in 168 years. Supposing the tree to have been $9\frac{1}{2}$ inches when planted, you see it increased an inch yearly.—And I have a deed between an ancestor of mine, as lord of the manor of Stratton, and his copyhold tenants, upon his inclosing some of the waste, wherein the abuttal to the west is upon the road leading from Hevingham to Norwich, which you know cannot be mistaken: the date is 1580, and the largest oak on that bank, at 4 feet, was, last autumn 1778, 16 feet, $3\frac{1}{2}$ inches, or $195\frac{1}{2}$ inches in 198 years.

Now, from the increase of the Bentley oak, I conclude the Tortworth chefnut is not less than 1100 years old; perhaps it may be much older.

Sir R. Atkins, in his History of Gloucestershire, (p. 413) says, "by tradition this tree was growing in King John's reign, and is 19 yards in compass;" and I believe it is at least so large near the earth.

I planted an oak in 1720, which was last autumn 7 f. 9 in. I do not pretend to remember the size when planted,

but in autumn 1742, it was 2 f. $11\frac{1}{2}$ in.; *i. e.* $57\frac{1}{2}$ inch. increase in 36 years—above an inch and a half yearly. But this oak was taken from very poor land to a tolerable light-soil, and stands single; and perhaps the growth was helped by digging a large circle round it in several winters, and in other years having that circle covered with greasy pond mud; and in some dry seasons I washed the stem: the advantage of washing I experienced in 1775, greatly to my satisfaction. But supposing these endeavours did not help the growth of this oak, yet I apprehend it will not be 225 inches in circumference when 200 years old. For though the Hevingham chesnut is a healthful tree, it has increased but 25 inches and a half in the last 36 years, (*viz.* from my first measuring it) which shews, if it had not gained more in its younger state, it would have taken 250 years, to make its present bulk of 176 inches; and my oak of 198 years old has, from 1760, increased only $12\frac{1}{2}$ inches in eighteen years; which proportion would take 275 years to make 195 inches: and the oak by Bentley, according to the last 19 years increase, would take above 15500 years to make 408 inches, the present circumference of the tree.—*Obs.* 1792.

[ANONYMOUS.]

The best method of raising elms quick is the following: when you fell elm timber, in the spring, sow the chips, made in trimming or hewing them green, on a piece of ground newly ploughed, as you would corn, and harrow them in. Every chip which has an eye, or bud-knot, or some bark on it, will immediately shoot like the cuttings of potatoes; and the plants thus raised having no tap-roots, but shooting their fibres horizontally in the richest part of the soil, will be more vigorous, and may be more safely and easily transplanted, than when raised from seed, or in any other method.

[*By Mr. FLETCHER, near Northleach.*]

Having been pretty largely concerned in planting forest trees, on various soils, for more than twenty years, and tried different methods, I have found, by repeated experience, that no land whatever is so proper for the growth of *ash* in particular, as swampy, rushy, and boggy soils. I have planted ash on land which was so boggy and rotten, that the men were obliged to stand on boards, to prevent their being mired, and which, from its situation, could never be drained so as to render it fit for the cultivation of corn or grasses. It was astonishing to see their growth. Facts can be easily produced to prove, that such land (not worth a shilling per acre for any other purpose) has in divers places produced, in 13 or 14 years, from 60 to 70 pounds worth of the finest ash poles, at a moderate price, besides leaving a proper quantity of oaks, &c. sown with them, for maiden timber.—*Oct. 1777.*

[ANONYMOUS.]

There are three kinds of land usually termed barren; and with respect to almost every purpose but that of planting, they are and must remain so. The first kind is mere sand — This soil will pay better by being planted with Scotch fir, and larches than any thing else.

The second kind is boggy or wet moors, which are sometimes so situated as not to be drained without too great an expence. Wherever this is the case, such soils may be planted to great advantage. Ash for poles or coping will thrive here beyond expectation; and alders, with several species of the fallow tribe, will grow rapidly, and in 20 years after planting, pay a profit of 3l. per acre per ann. for the whole time.

The third soil on which planting answers better than any thing else, is barren rocky hills, which cannot be ploughed

on account of the stones lying level with the surface, or growing above it. In these situations intermix Scotch firs, which will secure less hardy trees from the fury of the winds, especially if a double row of them form the boundary.

These plantations may be made with beech, birch, oak, ash, sycamore, and black poplar; always observing to place the tenderest trees in the least exposed situations, where they are sheltered from north and east winds. In places where the soil is very thin, raise little hillocks about the young plants, which will greatly encourage their growth.

If oaks, chestnuts, or beech, or indeed any other tree that sheds its leaves in winter, grow crooked, make incisions with the point of a knife from top to bottom in the hollow part. This will occasion the tree to increase in bulk more in those parts than in any other; and by this simple easy method, I have known many a crooked tree grow straight and handsome.

[By Mr. WAGSTAFFE.]

Having often seen and regretted the nakedness that appears in the hedge-rows of new and upland inclosures, I thought an expedient in planting might be hit upon to raise prosperous trees, that would at once decorate and improve such inclosures. That which appeared most likely to prove advantageous was the *black*, or, as it is sometimes called, the *red*, wood poplar [*populus nigra*.] This species will quickly grow to valuable timber; and when intermixed in the rows with the *populus alba*, [abele] makes a beautiful appearance. I observed in one particular situation a tree of the latter kind, which its proprietor (who knew not how it came there) called by the name of the *Dutch beech*. With the farmer's permission, I lopp'd numerous cuttings or small stands of the former, and many such from the latter, which had be-

for some years propagated in my own plantations. The general length of these stands was from five to seven feet, which I planted on the boundary of a piece of upland heath-ground, to be inclosed early in the spring, before the foliation of any leaves could take place.

Upon the interior edge of the intended ditch, holes were made about ten inches deep, and two feet from its brow; and their contents (the turf excepted) were thrown off. In these holes the cuttings were placed, and a spade-full or two of earth, from different soils previously mixed for the purpose, filled up the holes, and fixed the cuttings firmly. Upon opening the ditch soon after planting them, I had the turfs piled round each about a foot above the level. After this the contents of the ditch were thrown up to form the bank, which left the stands in the middle of it. This was the whole process respecting them. A layer of quick was then planted, and the bank guarded with thorns. These cuttings generally succeeded.—*Aug. 1785.*

[*By Sir THOMAS BEEVOR.*]

A nobleman of this county, wishing to know the duration of some of the trees with which his noble plantations abound, ordered, in the year 1774, three posts, forming two sides of a quadrangle, to be fixed in the earth upon a rising ground in his park. Into these posts were morticed the planks of the following trees, of which six faced south and north, and six of them east and west. In the first were put a plant of cedar, larch, spruce fir, silver fir, Scotch fir, and pineaster. In the second, a plant of Spanish chestnut, abele, beech, walnut, sycamore, and birch.

These after being exposed to the injuries of the weather from the year 1774 until last March, (1784) the time at

which I viewed them, I then found in the following state and condition:—

The Cedar was perfectly found.	Pineaster, quite rotten.
Larch, the heart found, but the sap quite decayed.	Chestnut, perfectly found.
Spruce fir, found.	Abele, found.
Silver fir, in decay.	Beech, found.
Scotch fir, much decayed.	Walnut, in decay.
	Sycamore, much decayed.
	Birch, quite rotten.

These planks were cut out $1\frac{1}{2}$ inch thick, from trees of 30 years growth.—*Hethell-Hall, Norfolk, Sept. 1784.*

[By Mr. PAVIER; *West-Monckton, March 1788.*]

“Were the forest of Dean duly improved, it were an imperial design; and I do pronounce it more worthy of a prince, who truly consults his glory in the highest interest of his subjects, than that of gaining battles, or subduing a province: for he not only secures the strength and glory of the nation, in preserving an abundant supply of timber for shipping; but also adds greatly to the number of people, by the many new farms for corn and grafs, erected where the land turns at present to little account for timber, which is universally neglected; and less for men, being uninhabited.”

The above is a quotation from Mr. Evelyn's *Sylva*. Now, let us suppose that instead of disposing of all the waste lands belonging to the Crown, some particular places, where the soil and situation seem adapted for producing good oak timber, were reserved to be improved for that purpose; the expence of inclosing is then the first thing that comes under consideration; and this expence will always vary in proportion to the form and magnitude of the land to be inclosed; as a field

of an hundred acres may sometimes be fenced in for the trifling sum of about ten shillings per acre, whilst another of but ten acres shall cost by the acre three times as much.

The next step will be to prepare the ground for the reception of the acorns, which will undoubtedly be best effected by frequent ploughings; I would therefore propose to keep it in constant tillage for two or three years, till the earth is brought to a fine, mellow state of tilth, and then to sow or plant the acorns in the autumn; the profit of the crops taken from off the premises will (no doubt) abundantly overpay all the expence of inclosing, as well as the collecting and sowing the acorns.

From hence it appears, that an improvement of this nature would be attended with very little, or perhaps no expence, but what would be amply repaid by the profits arising from the same; and I am persuaded, that no further trouble or expence would be necessary for several years, but to take care that no kind of cattle whatever be admitted into the inclosure.

When the plants are about eight or ten years old, it may be necessary to cut down the greater part, leaving a sufficient number of the most promising ones; the superfluous branches of which should then be taken off, which ought to be the only time they should ever be pruned. At every time of cutting the underwood, the young trees should be thinned with great discretion; the thicker they stand in reason whilst young, the better lengths will they arrive at: but I apprehend that each tree should at the least be allowed a hundred square yards for the expansion of its limbs. Allowing this to be a proper distance, an inclosure of fifty acres would produce 2420 trees, which I suppose would come to perfection in about an hundred years, and that they would be worth (on an average) 5l. each; the value of the timber on the fifty

acres would then be 12,100l.—Mr. Evelyn computes the profit of a thousand acres in 150 years to amount to upwards of 670,000l. How he made such a calculation, I cannot guess, but think the profit is charged much too high.

[By Mr. WAGSTAFFE.]

About twelve years since a field of elevated land came into my possession; the height of it had been left uncultivated for a course of years, on account of its unproductive quality. The aspect being open to the south, and its soil a deep sand, except its summit, which was gravel; I with pleasure embraced the opportunity of planting it, and had in view different species of American trees, raised from seeds about three years before, and which had in general exceeded in length of bole, for their age, any of the native trees of Britain that I had known raised from seed. At the same time I planted pines or firs of different distinctions, and of every species of forest trees frequent in our woods; and in which were included the three poplars, considered as the aborigines of our country.—The pines more generally died, (save on the summit) unless I here except the larch, which, if it lived, poorly thrived; the Americans lived without increase, perishing in the winter as low in their branches as their unvigorous summer shoots extended. The birch and the sycamore succeeded moderately on this sandy slope; but no other worthy of notice, save the white poplar and the asp, [*populus alba* & *tremula*] the former succeeded, with a single exception, beyond any instance of its growth I ever saw. A rooted cutting transplanted here about five feet high, is now in height near or full thirty feet, is in girth eighteen inches five feet from the ground; and thirteen feet up its trunk, I believe there are branches nine feet in extent.—Dec. 1788.

[ANONYMOUS.]

Red or black poplars planted on meadows near Norwich, on a good warm moist soil, from 1746 to 1748, in stands without roots, measure at at this time (1796) at about five feet from the ground, six feet and a half in circumference, and are from forty to fifty feet high. The same kind planted in the same place and manner, in 1765, 66, and 67, measure from four feet to five feet and an inch round, and are nearly equally as high as the foregoing.

A peculiar kind of abele tree planted at Seething in the year 1760, in stands without roots ten or eleven feet long, on a bank about thirteen feet broad, with water on each side, the bank firm land, measure at about five feet from the ground, from five feet to five feet nine inches round, and are tall flourishing trees.

Ash trees planted out in 1758 and 59, eight to nine feet high, on good meadow ground, are now from three feet eight inches to four feet round.

Oaks transplanted three or four feet high from a nursery in 1764 into a good lightish soil, dug two spades deep, well cleaned, the trees planted pretty thick, are become very tall, and measure at this time from eighteen inches to two feet round, at about five feet from the ground. Some of the same oaks left in the original nursery are from eighteen inches to two feet four inches in circumference. Some of the same, planted in an upland pasture (the soil clay) in 1769, when ten or eleven feet high, are now from eighteen inches to two feet round.

A particular timber oak measured in 1768 seven feet eight inches; 1771, eight feet; 1790, ten feet three inches. I have a small piece of ground, little more than half an acre, and worth about eight shillings a year, planted in 1764

with various kinds of firs, intermixed with young oaks. The firs have been felled by degrees for rails, joists, spars, and other uses, to the value of 25l. and have left a grove of healthy and promising oaks.

[By Mr. SOUTH, Bossington.]

It may not be generally known, that the destruction of oak, towards the middle of the present century, became so very rapid, as to occasion public enquiry in 1771; the returns to which ascertained, *that the naval timber had decreased in quantity within forty and fifty years then past, to the amazing amount of four-fifths on an average through the kingdom.* The year before last, there were fourscore oaks felled in this neighbourhood, *whose aggregate contents scarcely exceeded twenty tons;* and in 1758, a single tree was felled, but a few miles from the spot, *which contained in itself twenty-eight tons.*

Timber is become scarce on the continent as well as here; the increase of commerce causes such a demand, that it rises in value every where. The scarcity of knees and crooks of large dimensions is now severely felt; it is with difficulty the docks get supplied, so that ships are often at a stand for want of them. Planters should not only consider what suits their respective soils, but to what uses their timber may be appropriated. The elm ought to be led up tall and strait, for keel-pieces, ship's-pumps, water-pipes, &c. Abele, if brought to great length and substance, will make good beams and rafters for barns, cottages, &c.; for this timber, (not being subject to the worm) whilst under thatch that admits no wet, will continue sound above a century. The perfection of ash lies in its being free and tough, properties sought after by coopers, wheelwrights, and coach-makers. Beech, as a quick grower, repays the planter's toil; it thrives

well on chalky hills, and may be trained either to long boles for ship-planking, or to branchy crooks for mill-wheels; it is excellent in water-works of all kinds, for, where constantly kept wet, it is as durable as oak itself; and the present scarcity of that most valuable timber requires that we should employ every substitute we can in its place. The growers of oak should be most particularly attentive to the situation and demand. In inland countries, where carriage is a drawback, and prevents a profitable communication with the sea, timber, if thinned in due season, cannot be drawn up too fast. The house-carpenter, in situations like this, is the chief purchaser, and strait lengths are his delight. In maritime counties, a large crook in the bole of a tree doubles its value, and admits it into a dock-yard, when but two-thirds the contents of a strait one. Floor timbers, compass-pieces, knees, &c. are the basis of naval architecture, and cannot be dispensed with; such, when choice and large, carry in much inferior timber with them; and without a due proportion of such, no contract is ever made by the Navy-Board.

An oak felled in the year 1758, in Langley-Wood, belonging to the Bishop of Salisbury, upon the verge of the New-Forest, was sold in the first place for 40l.; was bought of that purchaser by the late Mr. White, of Anville, timber-merchant, for 100l. who is supposed to have cleared 100l. more; which he possibly might do, for the contents, as I was informed a few years since on the spot, amounted to thirty-two loads of hewed timber, which at 2s. 6d. a foot, (no unusual price for naval crooks) amounts to 200l. precisely, besides faggots, &c. sufficient to defray the expences.

The ELM delights in a rich black mould, where it attains its largest size. It thrives well, and produces the toughest and best timber in a hazely loam. It will grow on gravel, but disgraces chalk, and detests morafs. It requires an open

space, and much room for its roots to spread in; if confined in groves, it deceives the planter; the borderers only arrive at perfection, whilst those near the centre, though strait, are weak; and if through imprudence the large protective trees be cut down, the remainder, instead of improving, become dotards. These trees should therefore be either planted single, in small clumps, or in hedge-rows. The latter is the most profitable method, as the suckers which spring from the roots, will, under the protection of the hedge, furnish a continued succession.

As the growth of elm bears proportion to the extent of ground allotted for its roots to range in; those who would propagate large timber, must never plant too close. Though branchy elms are the quickest growers, they are not the most profitable to the planter; for such timber is little sought after, and one branch only being accepted by the merchant as timber, the rest all go with the top, which reduces the contents exceedingly. As the value of this timber consists more in the length and bulk of the shaft, than in the crooks and contents of its branches, it is the business of planters to train them up tall and strait, to keep their shafts clean, and not to suffer them to branch till within a few feet of the top. The present method of lopping, though conducive to the lengthening of the shaft, fills it full of rough protuberances, which, by admitting water, are very prejudicial to the timber, and occasion the defects so generally complained of.

The shaft of the elm advances inch by inch through its whole contents, that is, every inch lengthens yearly; by this means it advances more or less in proportion to its length, besides the addition of new wood at the top; so that a branch now thirty feet from the ground, will (in a growing stick) five years hence be removed higher by a foot, consequently the timber is increasing in length beneath that

branch, as well as above it. The growth of elm is to that of oak, in a hazely loam like mine, as three to two, and the value of the timber, if long and strait, as two to three. The profits of the planter, therefore, both in oak and elm, will be nearly on an equality.

Care should be taken in planting to shorten all the side-shoots, and leave the leading shoot entire. In three or four years afterwards, cut the lowermost of the shortened shoots clean off, and shorten most of the maiden shoots above them, carefully preserving the leading shoot, and prevent its having a competitor; at Midsummer following, strip off all such sprays as have put forth from the sides of the wounds (by hand.) Proceed in this manner every three or four years, cleansing about four feet of the stem at a time, shortening the upper branches, cutting off close those which were shortened at the preceding trimming, and stripping afresh at Midsummer, till thirty or forty feet of shaft is obtained without spray or blemish; they may then be left to themselves, for the shaft will lengthen some feet, and should they put out more sprays from the lips of the old wounds, such may be stripped off by hand, from time to time, till this vicious inclination ceases.

ABELE.—The rapid growth of this timber having been already ascertained by a former correspondent, I have little to add, save that not being subject to the ravages of the worm, it is applicable to more useful purposes than that gentleman has assigned to it. After the storm in 1781, which not only blew down my elms, but my barns likewise, I rebuilt one of five bays, and twenty-four feet long in the beams, and roofed it entirely with this timber; and from the experience of others, together with the present appearance of the beams, rafters, &c. have reason to think that my grand-children will not find fault with it. These trees are

often subject to warty excrescences, which, when large, imbibe moisture, and bring on decay. Whilst the plants are young they do little injury, yet it is adviseable to root up such as are much disfigured with them, to give room to those which are healthy.

ALDER, as patten-makers' timber, merits little regard; but being the most beautiful of the whole aquatic tribe, is extremely ornamental along the banks of serpentine rivulets, or planted as single trees in springy gravels, or peaty bogs, where little else will grow. When charred it makes the best coal for gunpowder.

The growth of ASH in soils adapted to its nature is little inferior to that of elm or beech. Ash timber, when raised in damp meadows, or moorish soils, becomes light, spongy, brittle, and of small value in comparison of that on dry and healthy spots. In meadows, they will attain a size which cannot be expected in moors and bogs; for when the roots reach the peat, the bark grows mossy, and the top decays. How long stubs be productive of poles, in such situations, remains to be determined, but experience convinces me, that ash, thus planted, will never become timber of any value, as the roots must perish before the tree arrives at perfection. Ash trees in dairy plots are nuisances, as their leaves make the butter rancid and worthless; mixed with beeches in an open grove, they run to great lengths, are free cleft, and make valuable timber. Coach-makers, wheelwrights, &c. like the shafts when a little bent, more than when perfectly straight. The cooper has no objection to the latter.

The propagation of BEECH is strongly to be recommended as a free-grower, and applicable to many useful purposes. It saves oak (as before mentioned) in planking ships' bottoms, and in ringing mill-wheels; its close grain and firm texture render it unparalleled in water-works of all kinds, for when

constantly kept wet, it appears as perfectly sound at forty years end, as when first immersed. The mortices and tenons, chafed by the influx and reflux of water, will in time be the one enlarged, and the other diminished, but the wear in this timber is nothing like so great as that in elm; wherefore head-cells in mill races, weirs, &c. should be of beech, in preference to any timber whatsoever; and as the very offal is the most valuable cleft-wood, yielding one guinea a cord to the maltster, there are few trees more profitable to the planter in countries where there is a demand for it. The beech is the chief ornament of the Cheltern-hills in Buckinghamshire, and of the Horse-shoe hills in this county. It delights in chalky soils and lofty situations; it is more profitable in open groves or mingled with ash, than in coppice or underwood. Beeches may be trained to long strait shafts after the manner of elms, with this difference only, that spray must be left near the end of every shortened branch to keep it alive, otherwise it perishes, and becomes a faulty knot.

Though I do not think the SCOTCH FIR in this country can ever equal the yellow deal from the Baltick, yet it may be worth propagating, as of useful purpose in ordinary buildings. The drier the ground on which this timber grows, the slower is its progress, but the closer are its pores, and the more superior its quality.

An OAK, called Fyfield's-Oak, now standing in a wood near Romsey, in the county of Southampton, in 1778, was ten feet eleven inches, and is now nearly eleven feet one inch in circumference, at six feet from the ground. The very top branches are timber, the tree appears to be in a growing state, and though tradition says it is 150 years of age, its yearly increase is little (if any thing) less than an inch, and the best judges allow it to contain twelve loads of timber at least.

In the manor of Dibden, belonging to Lord Malmesbury, on the eastern bounds of the New-Forest, are some capital oaks; one in particular is larger than Fyfield's at equal distance from the ground, but inferior to it in height and solid contents. The growth of middle-aged oak is generally from one inch one third, to an inch, in circumference yearly; between its twentieth and its hundredth year it sometimes exceeds this measure; and in its second century falls within it. But as the solidity of the shaft consists less in its length, than in the square of its diameter in the girting place, a small addition to the diameter there enlarges the square abundantly. Wherefore, though the circumference from the hundredth to the hundred and fiftieth year, may not increase so fast as it did to the hundredth, the solid contents will be increasing faster.

Tall straight oaks, when of full size, are beautiful objects, whether single or in woods. They are requisite for beams, for kelsons, stern-posts, and plank-stocks; and great is the consumption of the latter; for ships are planked both within and without with oak, save beneath the light water-line, where beech performs that office. The growth of oaks like these is the chief aim of the generality of planters.

Planters of all kinds (as before observed) should attend to the uses to which their timber may be appropriated. Inclosures made at Government's expence, therefore, should be nurseries for timber adapted to government purposes. The marine, being the first and principal object, should in the first place be provided for. Trees dispersed on open commons and extensive wastes, have hitherto produced the choicest timber; and though the returns of the forests have of late years, through mismanagement, been very scanty, yet they have consisted of such valuable knees and crooks as the merchants would have found it difficult to have furnished.

Whoever traverses a forest, with the eye of curiosity awake, must remark, that almost every thorn becomes a nurse for timber. Acorns, or beech-masts, or sometimes both, dropped by birds or squirrels, vegetate freely under the shade and protection of the bushes, till they rise above the bite of cattle. Small groupes and single trees are thus produced; their guardian thorns, when overpowered, perish. Then, having open space for their roots to range in, their growth becomes rapid, their bodies bulky, their limbs large and extensive; cattle resort to them for shelter, enrich the ground with their droppings, the timber derives advantage from the manure, becomes productive of knees, crooks, and compass-pieces, the chief requisites in naval architecture. *Vide* No. I.

If lords of manors, and men of landed property, would pursue the hint which nature here throws out, and employ the aged and infirm, to collect and dib among the thorns (with which the wastes, furzy commons, and aukward corners of their estates abound) such tree-seeds as the soil is best adapted to; how soon would the face of the country be improved! what varieties of flourishing trees would in a few years present themselves! what provision made for posterity hereafter! In plantations thus begun, however divested of incumbrances in the advanced stages of their growth, few if any knees or naval crooks will be found, except upon their borders; we must look for these either in single trees, like No. I. in small groupes, or in hedge-rows. In groupes one or other often gains the mastery, as represented in No. II. or III. and forces the rest to bend forward till they have room for ascent. Trees, when few in number, enjoy a liberty nearly equal to single ones.

In this age, when our stock of timber is so very low, and our impatience such, that we cannot wait till the small quantity that is left attains maturity, we must not expect to find

Plate I.



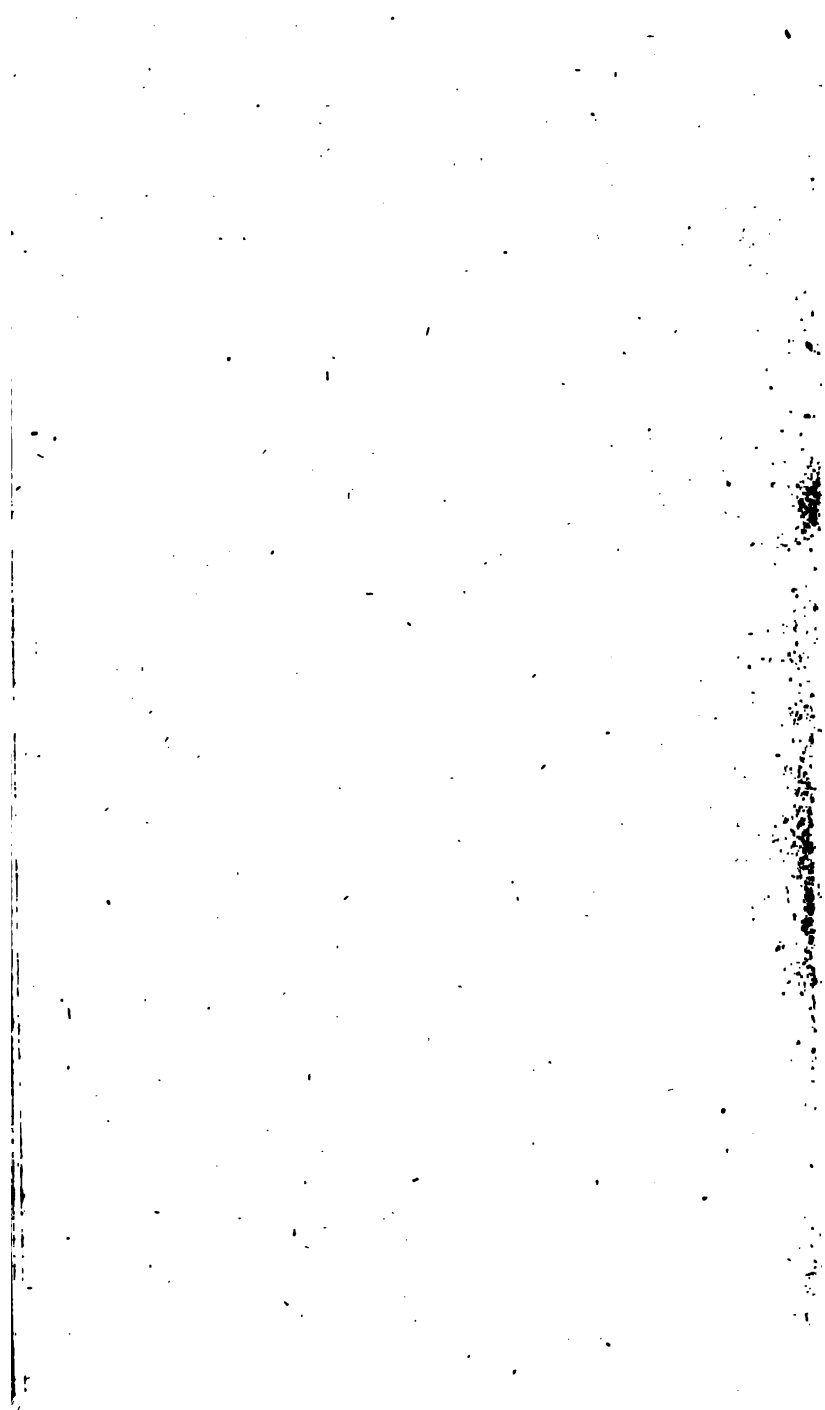
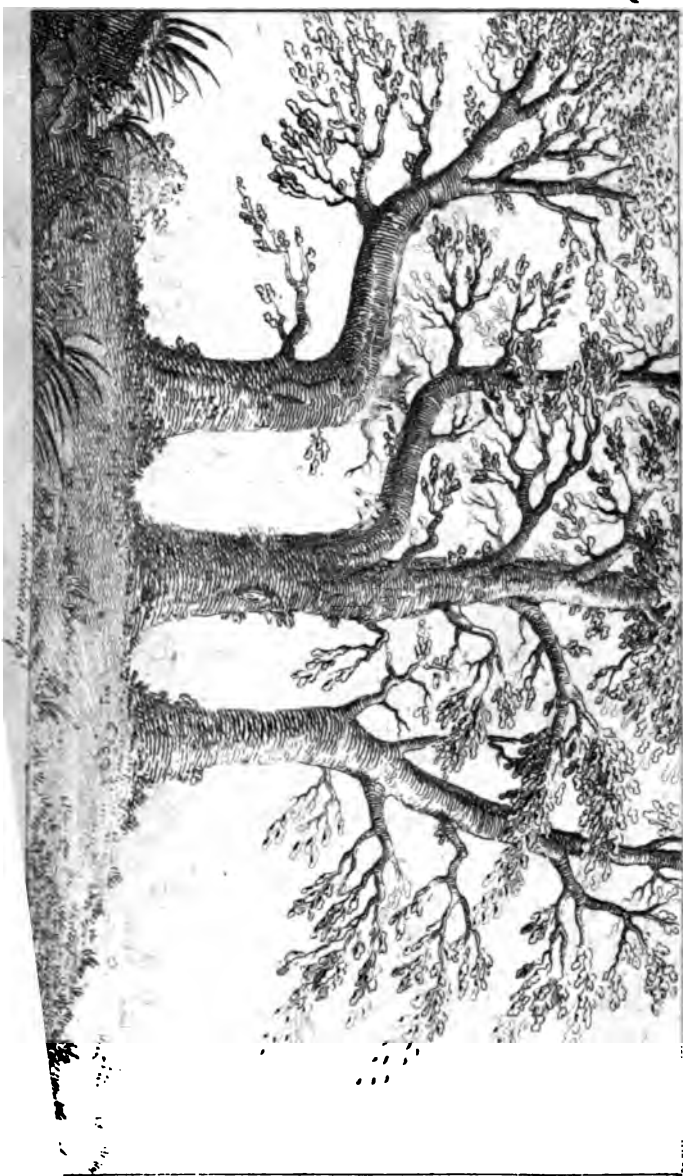




Plate III.



1. The first part of the document is a letter from the author to the reader, explaining the purpose of the study and the methods used. The letter is dated 1998 and is addressed to the reader.

2. The second part of the document is a list of references, which includes books, articles, and other sources used in the study. The references are listed in alphabetical order.

3. The third part of the document is a list of figures, which includes tables, graphs, and other visual aids. The figures are listed in alphabetical order.

4. The fourth part of the document is a list of tables, which includes tables of data, tables of results, and other tables. The tables are listed in alphabetical order.

5. The fifth part of the document is a list of appendices, which includes appendices of data, appendices of results, and other appendices. The appendices are listed in alphabetical order.

6. The sixth part of the document is a list of footnotes, which includes footnotes of data, footnotes of results, and other footnotes. The footnotes are listed in alphabetical order.

7. The seventh part of the document is a list of indexes, which includes indexes of data, indexes of results, and other indexes. The indexes are listed in alphabetical order.

8. The eighth part of the document is a list of glossaries, which includes glossaries of data, glossaries of results, and other glossaries. The glossaries are listed in alphabetical order.

9. The ninth part of the document is a list of bibliographies, which includes bibliographies of data, bibliographies of results, and other bibliographies. The bibliographies are listed in alphabetical order.

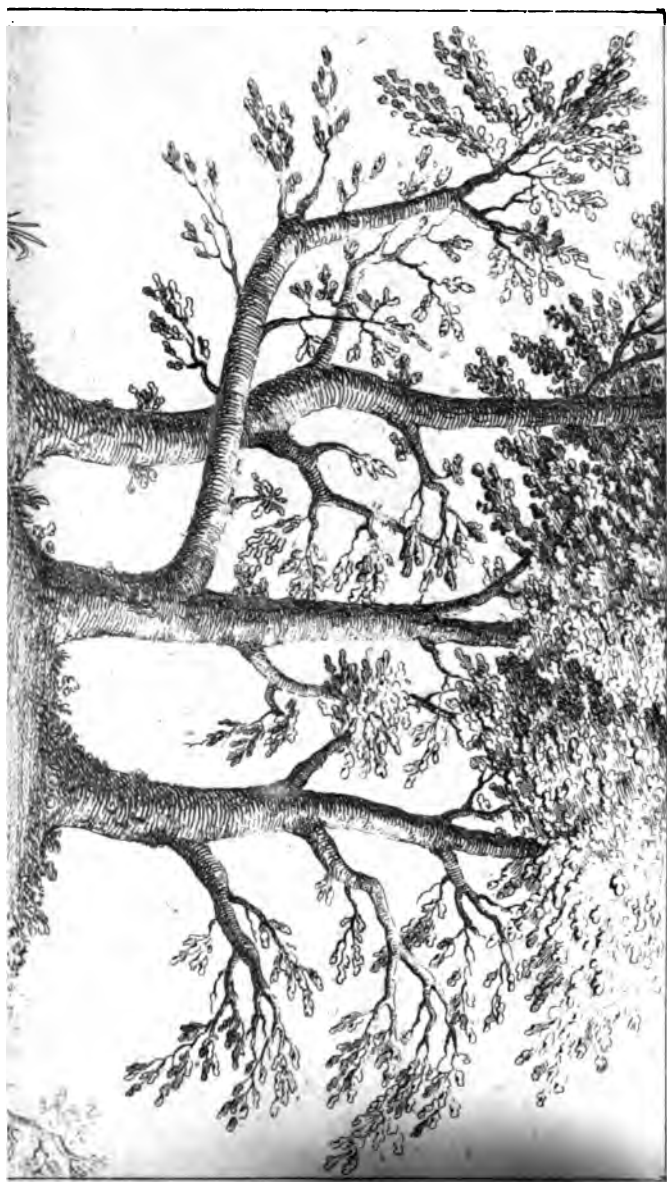


PLATE I.

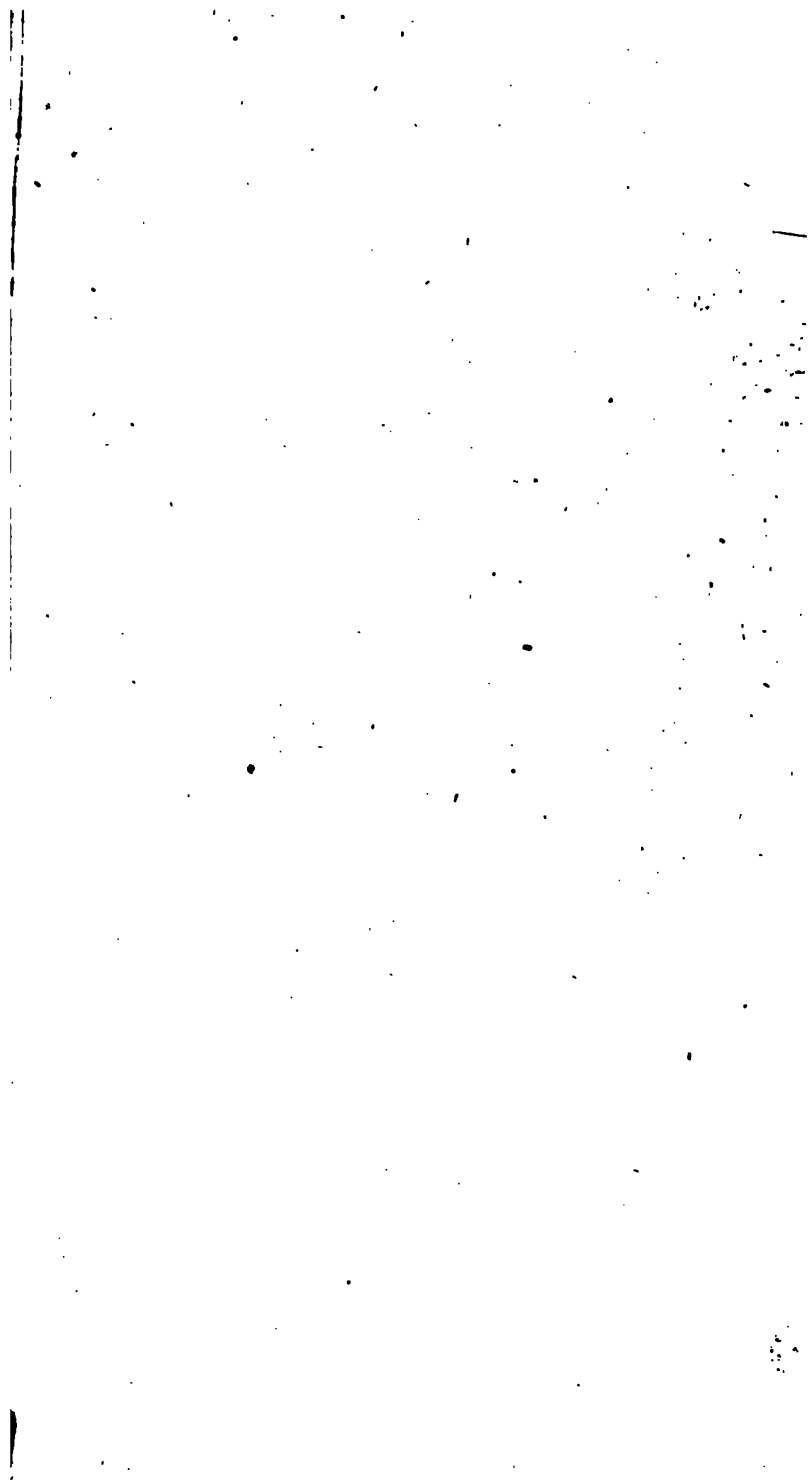
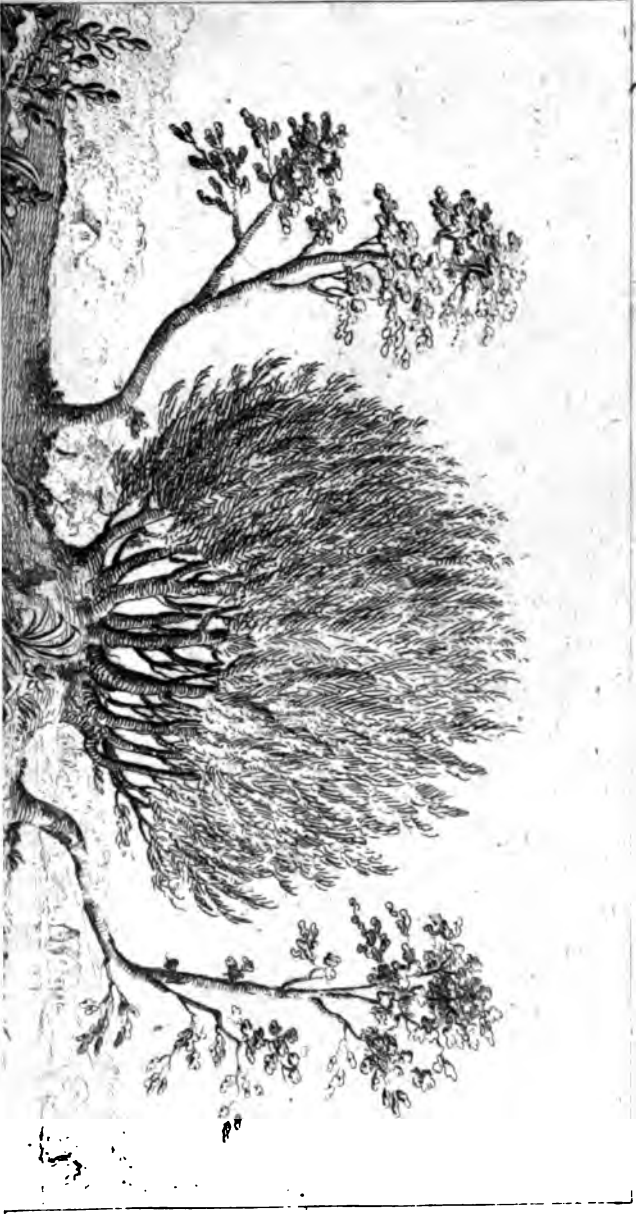


Plate V.







many capital crooks in branches like those of the Langley-Oak, but must produce them in the stem or bole of the tree; which can only be done by a regular and constant oppression; the effect whereof may be seen in figures No. II. and III. and in hedge-rows where the timber stands thick, as No. IV. represents. The centre stick of the three, growing behind the others, and not finding room to spend its sap by rising betwixt their tops, made its way out to the sun and air, as appears in the draught annexed, forming a capital knee and valuable crook above it. Hence it is manifest, that any quick-growing trees of small value, may be used as instruments for forcing seedling oaks out of their upright line. Cuttings of coppice withy will, by the freedom of their growth, (as represented No. V.) overpower the saplings, bearing them down almost to the ground for a time, and the purpose being effected, may for relief of the oaks be cut down as often as requisite, till, as they gain power, the withies in their turn give way. Plants like these, which extract nutrition of a different nature, though they promote a crook, will not starve or check the oaks beneath them.

Trees growing out of a bank frequently take a favourable turn, like No. VI. Such are accepted by the king's purveyors as compass-pieces, which gain admission into the dock-yards, though of less dimensions, and at a higher price than straighter timber. It may be proper, therefore, in new inclosures, to throw up the banks high and broad, to plant quicksets on the outer slope, on the top withies, and at due distances near the base of the inner slope to dib in acorns; which in their future growth must incline forwards to avoid the projecting withies, and be some years before they can attempt a perpendicular. In such case the crook will be near the butt of the timber, and the curve, thus formed in infancy, will retain its shape as long as the tree endures.

For sowing acorns, the inverted sod of the surveyors seems not equal to Mr. Pavier's method of preparing the ground, by bringing it into good tilth. I would add, dung it well for wheat, throw it up into ridges, sow hazle-nuts, floses, haws, holly-berries, ashen and maple keys, broad-cast with the wheat, and dib in acorns at ten or twelve feet distance, along the mid-ridges where the soil is best. At reaping-time, leave the stubble long to shelter the seedlings, and in the spring following scatter some clover-feed over the ground; much of it will grow to shade and protect the oaks when the stubble rots away. Patches of clover or wild vetches meliorate the soil, and promote the progress of the seedlings rapidly. These, as they advance, may be thinned and trained either to crooks or upright stems, as best suits the planter's purpose; for oaks, whilst the bark is smooth and white, may be divested of their straggling shoots without injury, for the wounds not being large, will soon heal over, leaving neither blemish or dead knot behind.

For planting, the ground should be trenched, and the oaks, if drawn from a warm nursery, must be set thick at first; but as soon as they appear in a growing state, should be thinned every three or four years at furthest, till set at twenty or thirty feet apart; even these distances are scarce sufficient for naval timber. Such as are taken out may be planted in vacant spots elsewhere; and if dug up carefully, there will be little danger of their failing.

In an additional letter, Mr. South informs us of his intention of publishing the result of his experience in the cultivation of fruit-trees, under the title of "The Gentleman's Recreation in the Fruit-Garden, or a Treatise on the Culture of Peaches and Nectarines." But this, Mr. South says, is not to take place till he has grown every peach and nectarine which the catalogues contain under his own eye.

[*By Sir THOMAS BEEVOR.*]

The growth and improvement of oak timber is certainly a matter of so much consequence, and of such great national concern, that the want of it cannot be too greatly dreaded, or precautions for the prevention of it too soon adopted; however, at present there does not seem to be in this county any just ground to apprehend the want of it, at least of small timber. The only two ports of note here, for building and repairing ships, are Yarmouth and Lynn, in which there has been no alteration in the price of timber for many years, excepting only small *occasional* fluctuations in it. And if the price of large oak timber has in the kingdom at large increased (as it is said to have done) from 7s. 6d. to 10s. per load, it should at the same time be remembered, that the consumption of oak timber between the years 1777 and 1783, six years only, was more than for the preceding twenty-three years. In the year 1783, I have been informed there were 43 sail of the line, and 5½ forty-gun ships building in the public and private yards; besides ten East-India ships of 900 tons each.—*Hethel, Norfolk, Nov. 1791.*

[*By Mr. DAVIS.*]

Extract from the Society's Letter of July 30th, 1791.

“As from the supposed neglect and scarcity of Oak Timber, planting and the preservation of woods is become an object of great national consequence, the Society wish to know your sentiments on the present state of oak plantations in general, and how far you think the Larch, or any other tree capable of being substituted for Oak in any branch of ship-building, has been attentively cultivated.”

There is now in the county of Hants alone, timber enough to supply nearly the common consumption of Portsmouth yard, and in the other maritime counties nearly sufficient for all the rest of the yards. But a great deal of oak in distant parts of the kingdom will now find its way to the sea-ports, by means of the many canals in the kingdom, which formerly were consumed only in the domestick uses of the county where it grew, while those same canals will bring back deal at a cheaper price to supply those domestick uses.

The uses of oak lessen every day. Houses were formerly built almost entirely with oak timber; but now the innumerable new houses in Bath, Bristol, London, Manchester, Birmingham, &c. have very little oak in them; deal answers the purpose, at a much cheaper rate. The great fear would be, provided that oak was only wanted for ship-building, that the price of it would sink so low as to make it hardly worth growing. Even now it would be difficult to find almost any kind of timber, that does not pay better for planting than oak; but luckily there are thousands of acres in this kingdom, where *oak* is *the weed of the country*, and grows without planting; and luckily there are two or three purposes for which oak timber is wanted besides ship-building, which will make it worth, the owners' while to encourage the growth of it in soils of that description, and will keep up its price in peace as well as war. *1st*. The continual and increasing demand for bark for tanning, which is now so great, that the bark is worth in inland situations, nearly one third of the value of the timber; and if the timber is small and near the sea-coast, nearly one half. *2^{dly}*. The amazing and increasing demand for beer-casks, of which the consumption is increased to an astonishing degree. *3^{dly}*. The demand for laths and spokes for wheels, with which the market is never overstocked.

These uses of oak timber, viz. for barrels, spokes, and laths, requiring only the straightest timber, will leave the crooked pieces, *the great desiderata of ship-building*, purposely for that use; and as by means of the canals, those pieces can be got to the sea-ports as cheap from the inland counties as by land-carriage from the maritime counties, there will be no danger of want of oak timber, either in the King's or merchants' yards; or that the price of it will rise higher than its real value, compared with the value of other timber.

Larch is a *strait-grained* tree, and cannot be brought into any of the *crooked* uses of a ship, nor will it stand wet and dry for planking. It may supply the place of deal for flooring; but the price of foreign deal at the sea-ports will probably be always lower than the price at which larch will be worth for country uses, where it grows. The larch will certainly answer all the purposes of fir for timber, but it is not so strong nor so heavy as Scotch fir.

Since writing the above, I have seen large quantities of oak timber in Devon and Cornwall, cut down merely on account of the high price of bark; the buyers of which offered to sell the timber again, as soon as they had stripped [barked] it, from 6d. down to 4d. a foot; and yet this timber was fit for building small coasting vessels, for which the demand increases, as that for ships of war decreases. Does this look like a scarcity?

[By Mr. PRYCE.]

The raising of oak timber for future navies was, I know, considered as an object of great national importance by John Pitt, esq; late surveyor-general of the King's woods and forests; who directed his attention to planting part of those unprofitable lands. Near twenty years ago he selected two

thousand acres for planting in different parts of the Forest of Dean, and one thousand acres in the New Forest. The land was inclosed for that purpose at a very considerable expence. I have lately seen part of those plantations in the New Forest, and have been well informed respecting the remainder. I am truly sorry to add, that they appear to have been neglected, exposed to damage, and are now in a deplorable state.—*Salisbury, Oct. 1791.*

[*By Mr. WARD, Marlborough; Oct. 1791.*]

The soil in this part of the country has not in general sufficient depth to produce fine oak timber; where it does grow well, as in Savernake-forest, it seems peculiarly well adapted for knee-timber; but from the want of water-carriage, and of a purchaser at hand, many a valuable lot of good knee-timber is used for the most inferior purposes of repairs, gate-posts, &c. As I have no knowledge in naval affairs, I can form no judgment in what respect Spanish-chestnut, elm, or larch, may be substituted to advantage for oak. Spanish chestnut, I have understood to be nearly as good as oak; but it is not a much faster growing tree, except while young; I believe it requires nearly as good a soil, and it does not do well except in sheltered situations, and is apt to shoot out in several stems from the bottom; which must retard and weaken the growth of the plant, till one leader overpowers and destroys the other shoots. In Lord Ailesbury's plantations the Spanish chestnut has run up with other trees, and makes a pretty respectable appearance; but where it grows single, it is generally stunted.

Elm, where the soil is suited to it, is a very profitable tree; it does best in sandy land; may be planted in hedge-rows with less injury to the quick-hedge than any other tree;

and when once planted, the succession may without trouble, and with very little care, be continued for ever, by suffering the shoots that rise spontaneously from the roots to grow up; and this tree has not the property of burning green. As to larch, from every observation I have made and heard, it seems clear, that it is one of the most profitable trees that grows.

[By E. C.]

The motives for inclosing open fields are obvious—utility and profit; therefore, as soon as it is determined to divide the land, the second consideration is to divide it with materials that will be both profitable and useful. I have not the smallest doubt, but that if all the hedges in England had been originally planted in the most profitable manner, they would have for centuries past produced, and would continue to produce, beverage, and materials for a sufficient supply of spirits, for the inhabitants of the whole kingdom; and likewise a sufficiency of food for fattening all the hogs, and paying the expences of new making, as often as occasion requires; and all this without being more injurious to the land than the hedges now in use.

To obtain all these benefits, plant at the distance of every twelve, sixteen, or twenty feet, a Spanish chestnut, midway plant a crab, midway between the chestnut and crab plant a common plumb-stock, midway between the several chestnuts, plumb, and crab-stocks, plant a white-thorn. When these several plantations have been made three or four years, and are in a thriving state, about the end of February or March cut them off with a sharp knife, about an inch or two from the ground; they will then throw out many shoots. Keep them well weeded, and let them continue growing until the chestnut shoots are large enough for

which will be in about six, seven, or eight years, according as the soil suits the plants. When the plants are formed into a hedge, for which there will be a plentiful supply of sleepers, stakes, and all the requisite materials; at the distance of every hundred, hundred and fifty, or two hundred feet, or at whatever distance fancy leads you, leave a handsome shoot of the chefnut, to grow into a tree; if you prefer timber, let it remain, and it will grow into a good timber-tree; if fruit, let it be grafted with grafts from the best chefnuts you can obtain; it would be desirable (if you had an opportunity) to procure the grafts from Spain. In like manner leave a strait handsome shoot of the crab-stock, and graft it with an apple; in like manner leave a plumb-stock, and graft it with a damson, or any good bearing plumb; likewise leave a handsome shoot of the white-thorn, and graft it with a medlar; thus will you have a very productive fruit-garden, that will always continue, as you may perpetually renovate by leaving fresh stocks every time the hedge is new made, without any waste of ground, and a permanent hedge equalled by few, and by none excelled.—*Bath, Nov. 1791.*

[By Mr. DAVIS; *Longleat.*]

It behoves those who are in possession of old well-planted woods, to keep them from going to decay; and, if their woods have suffered by age or neglect, to do their endeavours to restore them; for, notwithstanding the present almost general use of pit-coal has considerably diminished the consumption of wood and charcoal, for domestic purposes, the demand is still so very great for underwood, that woods will not only produce sufficient to pay *the rent* of the land on which they grow, but if in good situations, and well managed, will produce at least *half another rent*, by the timber

which may be raised in them, without any material injury to the underwood. It is a well-known fact, that woods are the best and most natural nurseries for timber, (particularly for oak and ash) and that the underwood contributes greatly by its shelter and protection to the growth of trees; but it has never yet been sufficiently considered, that it is almost incompatible with the present improved state of agriculture, and management of fences, to raise trees (except elms) to any great size, *in hedge-rows*; because the impoverishment of the soil by the roots, and the injury to the crops and fences by the dropping and shade of the tops, more than counterbalance the advantage to be gained by the growth of the timber.—The great demand for underwood in the Western counties is for the following purposes:

Ash-Poles.—For hop-poles, (in Hants) sheep-cribs, rind-hoops for barrels, and for rigging of ships, spade-handles, rake-stems, pick-stems, and other implements of husbandry—coach-makers, chair-makers, wheel-wrights, and carpenter's uses, &c. &c.

Hazel.—Sheep-hurdles in Hants, Wilts, and Dorset; spars for thatching; pease and bean-sticks, dead hedges, &c.

Alder, Willow, Birch, &c.—Poles for rafters, pattens, clogs, shoe-heels, turner's-ware, coal-pit uses, (particularly in the Mendip pits in Somersetshire) rails for fencing, chair-makers' uses, &c.

Oak.—For rough domestick uses; and bark for tanning.

General uses of all.—Faggots, particularly for fuel in farm-houses, and for baking; bavins for lighting fires in towns; thorns and refuse for dead hedges; and particularly charcoal for those manufactories to which pit-coal is not applicable, as well as for stoves in kitchens, &c.

The stocks (or as they are usually called in the Western counties, "Stools") which produce underwood or coppice—

wood, being in fact only *pollard trees growing under ground*; it is obvious that the produce of those stocks must, like the shrouds of pollard-trees, be the most abundant when the parent stocks are in the greatest perfection; that until they attain that perfection, the produce must be small; and that when they are past that perfection, they gradually decline, the shoots from them become weaker and fewer every successive cutting, and the stocks finally decay and die. It therefore follows, that to prevent the decay of woods, it is necessary, from time to time, to renew them by raising new stocks, to supply the place of those, which, from time to time, wear out and decay.

To recover Decayed Woods.—If it be profitable to plant new woods, it is certainly much more profitable to protect those that are already planted, to fill them up where thin, and to restore them when in a state of decay. The expence is not only lessened by the saving of new fences, but the profit is greatly increased, by the rapid growth of the wood, when planted in situations that are sheltered by other wood already planted. In those woods where saplings spring up in great numbers *spontaneously*, their growth should by all means be encouraged. At the time of cutting the underwood, these saplings will perhaps be 14 or 15 years old; and it might appear proper, after leaving for timber trees such as are strait and handsome, to cut off the rest for underwood. But great part of the saplings so cut off *at that age* will not be large enough to produce shoots *sufficiently strong* to get up as fast as the other underwood. *These shoots* would therefore suffer, and the stocks would never come to perfection. It is, therefore, more advisable not to cut off such saplings as are intended for underwood, until the *second cutting* of the wood, when (being perhaps near 30 years old) they will throw out shoots *strong enough* to force their way, and keep pace

with the surrounding underwood. Where saplings do not spring up in abundance spontaneously, young trees must be planted; part of which may be preserved for timber, and the remainder left, to be stubbed off for underwood.

Kinds of Wood to be planted.—The kinds of wood to be planted in coppices; either in making new ones, or filling up old ones, must be regulated, partly by *the demands of the country*, but chiefly by the *peculiar aptitude of the soil and situation* to produce particular sorts. *Let nature be your guide in planting, and you will seldom do wrong.*

Particular soils and particular situations will always favour particular kinds of trees; we need not look for the *reason*, but only for the *fact*. The chalk hills of Hampshire are peculiarly proper for beech; the flinty loams and clays of the same county, for oak and ash. The mossy steep sides of the Wiltshire downs, for hazel; and the sands of the same county for ash. The rugged and almost naked rocks of Mendip in Somersetshire, (near Cheddar) produce the lime-tree and the walnut in the greatest luxuriance, and on the highest parts of the same Mendip hills, where no other tree can stand the sea-breeze, sycamore flourishes as well as in the most fertile valley.

The periods of cutting underwood must be regulated by the luxuriance of its growth, and by the demand of the country, and the uses to which the wood is to be applied when cut; but, *in general terms*, the common rule of trade will hold good here, viz. that “*small gains and quick returns will make the dealer rich, but long credit ruins him.*” In the article of underwood, not only the interest of money, but the loss of the succeeding growth, tell against the value of standing wood after it is fit to cut, and make it doubly the advantage of the owner to cut his underwood as early as it is saleable.

Time of cutting Woods.—There are many opinions respecting the most proper time of the year for cutting underwood but there is one rule which, on the *seller's* part, is without exception, viz. that the older the wood is, the later in the spring it should be cut. When *old wood* is cut early in the winter, and a hard winter follows, the damage done to the stock is very great;—young flourishing wood will bear cutting at any time. But on the part of the *buyer* it is allowed that all woods are more durable, when cut in the most stagnant state of the sap; and in all uses where bending is required, such as hurdles, hoops, and even dead hedges, the wood cannot be cut too early in the winter, being, if cut when the *sap* is rising, *brittle*, and unfit for those purposes. Oak underwood will (at the present price of bark) pay well for standing till the sap is up for barking it, and it seldom happens that the stocks are injured by cutting it so late in the year.

Timber growing in Woods.—In every wood where timber will grow, it should by all means be encouraged, and if it does not come up spontaneously, should be planted.

STATE of WOODS in the WESTERN COUNTIES.

Hants.—Of all the Western counties, Hampshire has undoubtedly the pre-eminence, with respect to the quantity of wood-land, and the profit arising from it.

Wils.—The south-east part of Wiltshire, which adjoins to the county of Hants, viz. part of the New-Forest, and from thence to Winterflow, is exceedingly well wooded, and the woods partake much of the properties of those of Hants. The middle parts, or downs, of Wiltshire, are but sparingly wooded, nor is the soil so natural for wood as the downs of Hampshire; but in almost all the outskirts of the county there are valuable and flourishing woods, viz. Chute

forest on the east, *Itanium* itself in the north, Stanton, Farleigh, Welbury, and Wymminster woods on the west, and Cranbourn chase on the south.

Dorset.—The same remark holds good with respect to the county of Dorset, as above made on the county of Wilt, that the downs are *poorly* *manured*, and the soil not *so* natural for wood as that of *Hants*.

Somerset.—The county of Somerset is not famous for oak timber; as the middle parts of Wiltshire and Dorsetshire are *too poor* for its production, the middle part of Somersetshire is *too rich*. Oak timber never comes to perfection in any great quantity, in any countries where it is not the *work* of the soil. Stiff heavy land, if *ever so poor*, and indeed if *ever so thin*, generally abounds in oak. The *light, black, loose* soil of the Wiltshire hills, and the deep, rich, but *also loose* soil, of the moors and marshes of Somersetshire, are equally unfavourable to its *spontaneous* production.

Devon and Cornwall.—The counties of Cornwall and Devon, and particularly the latter, are peculiarly natural to the growth of oak; but the sea-breeze from the north channel is so very inimical to it, that, unless in sheltered situations, it seldom comes to perfection; and when the woods (which the owners are apt to let stand to a great age on account of the bark) are once cut down, it is difficult to get them to grow up again.

Gloucestershire.—But of all the Western counties, there is no instance of so peculiar an aptitude in the soil and climate to produce timber and underwood, and of so little attention being paid to the production of either, and particularly of timber, as in the county of Gloucester. There are very few parts of this kingdom which can boast of so great luxuriance in vegetation as this county. The bad management of the Forest of Dean, one of the finest nurseries for timber in the

kingdom, has so long been proverbial, that it is to be hoped some steps will soon be taken to wipe away the stigma, and make the forest as valuable as nature intended it should be —

Upon a *general enquiry* into the state of the woods in the western counties, and from an *actual knowledge* of a great part of them, the writer hereof is of opinion, that the *quantity of wood-land* in those counties is not reduced in *a great degree*.

[By Mr. WIMPEY.]

Whether oak timber, and timber and wood in general, has diminished, and is annually diminishing, is a question which cannot be decided by mere opinion; for opinion is unworthy of regard, unless it be founded on experience and observation. Recourse must therefore be had to facts collected from general observation. Every man, be the place of his residence wherever it may, either knows of himself whether he pays more for timber now than he did 20, 30, or 40 years ago, and the same for wood and fuel. If he does not possess this knowledge of himself, any of his neighbours can give him satisfactory information; but it must be observed, that the royal dock-yards are not the proper places for enquiry; for there the prices rise and fall, not in proportion to the increase or diminution of the general stock in the nation, but to its circumstances in regard to peace or war; thus, two or three years since, it is said to have been 30 per cent. lower (the nation being then in profound peace, and no war apprehended) than it had been during the last and former wars, or than it is or will be during the continuance of the present war. But the case is quite different in timber for domestic uses, not only as timber of the greatest value for maritime purposes is of the least for domestic use,

d *vice versa*; but as for that purpose, a diminution in quantity, and an increased demand, must infallibly advance the price, as it does in every article of commerce, without any single exception. I will explain and confirm this by facts within my own knowledge.

It is now nearly or about half a century since I began to take some considerable concern in building. I then resided in Wiltshire, on the borders of Hampshire; I bought timber of that time of prime size and quality, sawed out in scantlings to the carpenter's hand, for fourteen-pence a foot, delivered where it was to be used; which I am informed I believe, could not be bought at the same place now (if any thing) under double the price; and I well remember the price of wood for fuel was then upon the advance. About twenty years ago, we bought 2000 feet of timber, about two miles from the place where I now live, for sixpence a foot only; now timber of the same quality could not be bought any where in this neighbourhood for considerably more than double the money. At the same time I sold bark near this place for twenty-pence a hundred weight, and carried it sixteen miles; this season has been sold for five shillings a hundred, some for considerably more, and carried only eight miles. Wood for fuel it sold for ten shillings a few years ago, now sells for fifteen. But though the great hazard incurred by the neglect of cultivating oak timber is unquestionably great, it is by no means the whole of what is to be apprehended from it, nor indeed the worst part of it. Food and raiment are considered as articles of the first importance to the subsistence of us; but I believe it would be found upon fair examination, that the value of the first, which is the chief, is advanced an hundred fold by means of fire. What proportion of the people now living could be subsisted by the whole produce of

the earth in its raw unprepared condition? Without ~~fire~~ we could neither bake nor brew, roast, boil, or broil; ~~and~~ how long could men subsist on the roots and herbs of the field and the garden, as taken from the earth? These ~~are~~ serious questions, which force themselves to the observation in many parts of England; not merely through apprehension or anticipation, but by present hardships now really existing, and severely felt, and loudly complained of. The scarcity of fuel in some parts is so very great, that the poor at the approach of winter are in a state of despondency.—1794.

[By the same.]

The strange neglect of cultivating wood in a country where many thousands of acres, which in their present condition afford no profit worthy of notice either to the owner or occupier, therefore most assuredly none to the publick, must fill the mind with astonishment and disgust. In this county alone the quantity of land of this description is immense. The sum total of such land in Great-Britain must amount to some millions of acres. But it has been objected, "that planting wood has been so far from being considered as an improvement, that much hath been grubbed up, the ground cleared, and converted into arable or pasture." The practice was prudent, if the land was proper for either, and must be attended with great advantage; but that is no reason why land should not be planted with wood, when, from its situation and present condition, it is known to be good for little or nothing else; and perhaps it is more than probable, that those very lands so cleared, have been ameliorated and improved by this wood, which is now destroyed. Advantageous, however, as promoting and extending the planting of timber and wood in every point of view may

appear, it is not to be understood that I mean the immense quantity of land above-mentioned should be planted; perhaps one acre in twenty, or at most in fifteen, would be fully adequate to the intended improvement; so that the planting those lands, which in their present state are of very little value, would be so far from diminishing the quantity of pasture and arable land, that it would add immensely to it.

An extent of ground of 25 acres planted, and properly thinned to stand for timber, would support 10,000 trees; these in 30 or 40 years, let them be of whatever kinds you please, would amount to a very large sum, especially if we take into the account the poles and fuel that must be cut out to reduce the timber to its proper distance; but the great and important business is the improvement of the fields which those plantations are meant to protect and defend; an improvement not to be obtained by any other means whatever, which is in the power of man to pursue. It is absolutely the *fine qua non* of improvement in cold, bleak, exposed countries, which without it must remain, from generation to generation for 1000 years to come, as probably it has done for some thousands past.

[By Mr. SOUTH.]

As an ingenious correspondent of your's differs widely in opinion with me, respecting the present state of naval timber in the kingdom, and treats the apprehended scarcity of it as a chimera only; pardon me, if I take the liberty of diving deeper into the subject, in proof of the positions by me advanced.

In late circuits through countries well known before, I could not but observe that the woods had lost their dignity; acres, which within my memory were replete with noble oaks, have now scarce a naval stick to shew; woods, where

the forest lads have chased the bounding squirrel from tree to tree, for a mile or more in length, now lie void of timber, desolate and waste. Witnesses from Hampshire, Kent, Surry, Suffex, Hereford, can vouch such assertions to be true; and not confined to narrow districts only, but that the general face of the woodland parts of their respective countries hath of late years lost its most striking features, and the woods themselves their chiefest glories—both their branchy and their towering oaks.

On his observation, “that the dock-yard prices have vir-
“tually sunk of late, by increasing the metings of timber
“they take in;” permit me to remark, that in taking large
pieces at the old price, they favour the merchant, by winking
at an encroached profit, which has been gradually creeping
on, to upwards of sixteen per cent. That in rejecting the
small, they do but justice to the Crown; for from an estab-
lished rule of near a century standing, no sticks under sixty
feet metings were admissible; knees, crooks, and compass-
pieces, only excepted. At that time the round stick of a
ton, hard hewn, extended to a load, viz. forty feet of round
timber. (by the accustomed measurement of the day) pro-
duced fifty feet of square timber at the most. Now, such is
the improvement of commerce, or the art of those who are
concerned in it, that the round shaft of forty feet disappoints
the merchant, and the labourer who chips it is blamed, if it
doth not measure sixty feet when hewed; and four trees
out of five are made to do it, so great is the improvement in
hewing. Wherefore small timbers (viz. sticks of a ton)
which gain the most, if taken at the new metings, are equal
to few naval purposes, being fit for sloops, cutters, and infe-
rior vessels only. In time of war, such diminutive stuff
(though little in request) must be taken, to induce the mer-
chants to furnish requisites. In time of peace, the yards

being consequently cumbered with such trash, the purveyors refuse to admit any more of it.

As to "Hampshire alone being nearly able to supply the common consumption of Portsmouth-Dock," which upon an average demands, I presume, 8000 loads a year; hear what Gilpin says of that old, extensive famous nursery of oaks, the New Forest:—"Many parts of it are now in a state of extreme decay, being overspread merely with holmes, underwood, and stunted trees, which, in the memory of man, were full of excellent oak. This forest, at the first appointment of a purveyor in 1666, did send five hundred oaks and fifty beeches annually to the dock-yards, and continued so to do, till being found unequal to the task, the number became reduced to sixty oaks; which, together with fifty beeches, are still annually assigned."

To what a state of devastation then must 63,845 acres of forest-land be reduced, when they cannot afford one oak from every thousand acres for the yearly supply of the King's navy? Were devastation confined to a single forest only, the consequence might not be much dreaded: but when we see it pervade the land; when private woods, as well as royal forests, groan under the woodman's axe; when the squirrels, which used to skip from oak to oak, are driven "to walk on foot" in search of firs; it is time for us to reflect on the danger of our situation, and on the necessity of refraining from felling half-formed sticks; a growing mischief, alarmingly increased of late by the high price and great scarcity of bark, which has within these few years doubled its former value, and as your correspondent admits, caused the fall of numerous oaks in Devonshire and Cornwall; which from his account must have been all sap or blea, of little present worth as timber, but might, if left standing, have been the hopes and safeguard of future generations. Such destruction has

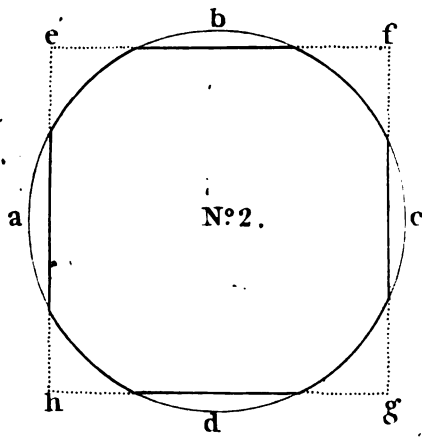
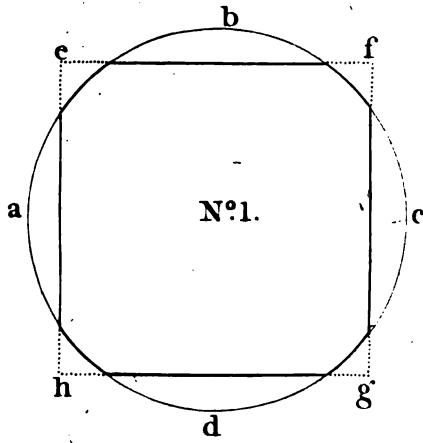
been too prevalent in the Eastern as well as Western countries: to the state of timber in the Northern, I profess myself a stranger. But when assured from authentic documents founded on indisputable facts, that the *aggregate of oaks* fallen in England and Wales, for thirty years past, hath amounted to 320,000 loads a year, where is the man of reflection that will not be alarmed for the consequences of such a demand considering the present state of the woodlands round him? Whether this amazing quantity be consumed in spokes, laths, in beer-casks, or what else, it matters not. The question is, doth the progress of young timber keep pace with the consumption? The observations of nine out of ten of the best-informed people with whom I have either conversed or pondered, justify my opinion that it does not.

P. S. To explain what is meant by the modern improvement in hewing, to those who are not conversant in the business, let circles No. 1 and 2 [*in the plate annexed*] suppose to represent the central part, or usual girting-place, of a flitch of oak forty feet long, and the periphery of such circles to be four feet round; then the girth, which is one quarter of the periphery, will be twelve inches, and the measure of the shaft will be forty feet, or a ton.

When timber was hewed after the old method, the elements *a, b, c, d*, No. 1, were chipped off. A rule was then laid from *e* to *f*, and the number of inches between the perpendiculars *e, b*, and *f, g*, were considered as the side of a square: which multiplied into itself gave the number of square inches contained within its compass, which multiplied by twelve gave the contents of one foot in length, and that again by forty the contents of the tree.

Thus the circle itself girting twelve inches, contains within the periphery 144 square inches; the triangles *e, f, g*, though areas only, are in square timber taken as solids; the

*



by multiplying the side e, f ,* (or $13\frac{1}{2}$ inches nearly) into itself, about 180 square inches will be produced: that is, the square contains 36 inches, or one-fourth more than the circle; and that extended through the stick, the 40 feet, or ton of round timber, become a load, or 50 feet when squared.

No. 2 is a circle of the same size as No. 1; but the segments chipped off at a, b, c, d , in the new method, are much smaller; the triangular areas e, f, g, h , of course considerably enlarged, and the side of the square e, f , lengthened nearly to $14\frac{1}{2}$ inches;† which multiplied into itself produces about 216 square inches, viz. half as much again (for $72 + 72 = 144, \frac{1}{2} \cdot 72 = 216$) as the contents of the circle; consequently, by this slight hewing, a round stick of forty feet becomes half as much more (i. e. sixty feet) when squared.

N. B. Round or girt measure gives less than the real Contents of a stick. Square measure gave at all times more, now much more.

[By Mr. EDMUND RACK.]

I have lately examined a fine plantation of ash-trees on a piece of moor-land in Essex. The soil was a black boggy moor, and had formerly been a hopground: but so wet that it would not answer for that or any other purpose in agriculture, altho' it had been cut across with many open drains, five feet deep, to take off the water. The quantity was 3 statute

* 13.5		† 14.75
13.5		14.75
<hr/>		<hr/>
675		7375
405		10325
136		5900
<hr/>		<hr/>
182.25		1475
<hr/>		<hr/>
		217.5625
		<hr/>

acres, and the following account of the planting and produce was given me by the farmer in writing from his own register.

‘ In the spring of 1764, I planted these three acres of black moor with small seedling ash plants, drawn from my woods, hedges, and waste grounds, at four feet distance from each other. When they had stood two years, I cut them down within four inches of the ground. I then let them stand ten years, during which time they throve exceedingly: and in February 1776, I cut one acre and a half. The produce was as follows:

	£.	s.	d.
31 hundred of poles, sold on the premises for	-	39	6 0
11 loads of firewood, sold also on the premises			
at 16s. per load	—	—	— 8 16 0
			£.48 2 0

‘ The other acre and a half is still standing, and much superior to that already cut.’—*June 1779.*

[*By Dr. B. PUGH.*]

I am surpris'd at these gentlemen, who seem to be so well versed in the comparative value of timber trees, take little, if any, notice of the *horse chesnut*, and *sweet chesnut*, which trees make exceeding good timber, are certain and quick growers in every kind of soil, and the beauty of the flowers of the former quite equal to the most beautiful shrub in the garden; and as for the duration of the timber, especially the *sweet chesnut* in the dry, it is equal to the oak. I have seen a large barn that was built of this timber, which had stood some hundred years, and all perfectly sound.

The black withey makes the best hedge-stakes that can be used, because they are straight and handy, and will all grow; whereas all other stakes, in three or four years, rot and become useless, and a temptation to hedge-breakers.

Measurement of three Oaks at Dibden, near Southampton.—[By Mr. WEBB.]

1st. As to a young oak said to have sprung up about the year 1755.

	Circumference.		Measure.		Value.
	Inches.		Feet.		s. d.
15th August 1776	- 32 $\frac{1}{2}$	- -	4	- -	4 0
18th April 1783	- 42 $\frac{1}{2}$	- -	8	- -	10 0
25th March 1794	- 56 $\frac{1}{2}$	- -	16	- -	24 0

The above oak stands single, is a thrifty tree, but does not appear to grow so rapidly as several others which have not been measured.

2^{dly}. As to an oak now about 70 or 80 years growth.

	Circumference.		Measure.		Value.
	Inches.		Feet.		l. s. d.
28th March 1762	- 58 $\frac{1}{2}$	- -	18	- 1	7 0
19th April 1780	- 72 $\frac{1}{2}$	- -	35	- 3	5 0
25th March 1794	- 81 $\frac{1}{2}$	- -	45 $\frac{1}{2}$	- 4	15 6

The last-mentioned oak is now a kindly-growing tree, but is observable that after its value exceeded about 3l. it has not paid quite so much as three per cent. compound interest.

3^{dly}. As to a ripe oak, tho' still growing, without the least appearance of decay.

	Circumference.		Measure.		Value.
	Inches.		Feet.		l. s. d.
28th March 1762	- 105	- -	117	- 16	7 6
19th April 1780	- 118 $\frac{1}{2}$	- -	150	- 22	19 0
25th March 1794	- 125 $\frac{1}{2}$	- -	170	- 27	14 6

The growth of knees may be promoted by cutting off the tops of such young trees as throw out a good strong limb, about three or four feet above such limb; and by layering, or setting of saplings, to fix the stem along the ground, from which young shoots will arise nearly perpendicularly, and make the strongest knees, and much sooner than from the limbs of old trees. The growth of compass timber may be promoted by bending young trees, and tying the tops of them together for several years until the stems get fixed.—Dec. 1795.

On Apples, Apple-Trees, Pears, Cider, &c.

[*By Mr. SAMUEL.*]

I HAVE heard it frequently remarked, that a good apple is hardly ever to be procured but near large towns; and in general I have found the observation just.

If the Society recommended to their correspondents and other gentlemen, a disposal of good grafts, round their respective neighbourhoods, I should not doubt but in a very few years every county would be plentifully supplied with the best apples.

[*By Mr. GRIMWOOD, Kensington.*]

It is mine as well as the general opinion that the degeneracy is not in the fruit, but in the tree owing either to want of health, the season, the soil, the mode of planting, or to the stock which they are grafted on, being too often raised from the seed of apples in the same place or county: it appears from the ablest men in my profession, that they never found a real decline in any one kind of fruit, but from the above causes.—To make a fair experiment, I should be much obliged to any gentleman that will take trouble to send me a few cuttings from those very trees, the fruit of which is supposed to be degenerated from the original goodness. I would graft them on the real crab-stock, and some also on the stock raised from the apple-pips in this county; then send the trees to the place where the cuttings came from;—by which means (through the process is tedious) we shall be able to ascertain, whether the change of stock will not restore the fruit to its original goodness.

It is my opinion, that if planters of orchards would procure the trees grafted on real crab-stocks from a distant county, they would find their account in so doing much over-balance the extra expence of charge and carriage.

My reason for recommending the true crab-stock is, that I believe the crab to be a native of this country; but whether it is or not, we are sure it is much hardier than the stocks raised from apple-pips; and there cannot be a doubt but the apple was originally an exotic. The crab-stock will succeed in many different soils, particularly in stiff, cold, moist ground, where the apple-stock will canker and die. I recommend the crab-stock for this reason, as also that it not so early in vegetating as the apple; by which a few days may preserve the flower from the cold blasts, and be the means of saving a fine crop of fruit.—*Dec. 1786.*

[*By Mr. GILLINGWATER.*]

I observed in the Ipswich Journal of Saturday last, that circular letters were sent from the Secretary of the Bath Agriculture Society, relative to a representation made to that Society, viz. "That in most of the counties, and particularly in that of Worcester, the old and best kinds of apples are nearly lost; and that by persons conversant in fruit-trees it is apprehended, they will in a few years be entirely gone." I must acknowledge, that I was struck with the representation; and it immediately occurred to me, the conversation which we lately had at Harleston, when I observed to you the danger which orchards of apple-trees, when planted too near each other, were exposed to, from the mixture of various farina: and this, I apprehend, is the cause of the degeneracy of all the old and best kind of apple-trees in the great cider counties of this kingdom, which is here complained of; and which the Society so earnestly requests its members to extend their enquiries concerning.

This conjecture appears to me extremely reasonable; for if the great variety of apples, and also other fruits, be produced by the casual intermixture of different farina, the fruit

also itself must be affected. The old and best kinds of apple-trees, I apprehend, are not lost at all, but are only corrupted from being planted too near bad neighbours :—remove them to a situation where they are not exposed to this inconvenience, and they will immediately recover their original excellency.—*Harleston, Suffolk, July 1786.*

[*By Mr. WAGSTAFFE.*]

An Advertence to the foregoing.

The remarks of my friend respecting the probable alteration in the distinguishing quality and flavour of fruits, by an indiscriminate planting of various species of apple-trees together, are unquestionably well-founded; but whether the entire depravity can be conquered, and a perfect regeneration of the original specifick quality of the fruit be recovered, is a matter of question. For we may consider the circulation of the sap in trees as somewhat analogous to that of the fluids in animated bodies; and that the latter imbibes salubrity and contagion from the approximation of different subjects; whereby a constitutional change is sometimes effected.—It has been found on trial that a scion ingrafted hath not always produced that specifick fruit from whence it was presumed to be taken; and that the mere insertion of the bud in inoculation hath, without sensible vegetation, altered the habit of the plant in which it was inserted.

It is a piece of justice to advert to some subsequent remarks from my friend, that “no degeneracy is to be apprehended from the proximity of other fruit-trees; as the admirable disposition of the receptacle to its farina, denies every ungenerical impregnation.”

Mr. Wagstaffe recommends grafting crab-stocks and white-thorns in the hedge-rows by which the boundaries of a field might become useful.—*Nov. 1787.*

[*By the Same.*]

The fluid extracted from a species of maple, perhaps two of the maples of America, may be adduced in certain evidence, that sugar is not the produce of the cane only, as it is generated from the maple tree in substance and quality not distinguishable from the product of that plant.

Now the action of fire on pears, in the common culinary process, gives even to the most austere of this fruit a saccharine quality: I have had different species of pears, some of them hard, stoney, and unpalatable, baked at different times; all of which, when duly baked, are more or less replete with this quality, insomuch that their pulp, added in a proportion of about a fourth or fifth part to apples baked in small pies, gives the required sweetness, and it has seemed to me pleasing to every palate as though sweetened with sugar: the same requisite sweetness is likewise communicated by the inspissated juice in which they are baked, which juice or syrup is formed by a portion of beer or water put to the pears before they are put into the oven; and which seems to attract the native juice of the pear in a larger proportion than what might flow if baked without an added fluid. This apparent syrup impresses the palate with the sweetness of real sugar, and which imparts to milk, and the acid pulp of apples, its sweet quality, not distinguishable in these subjects from what it is used for.

I therefore cannot but find myself interested, in earnestly wishing that some encouragement might be given, to ascertain whether such a substance as sugar is not obtainable from this luscious fruit when thus prepared by fire.

In addition to hawthorn stocks, observe, that they take with known facility upon the quince, the stocks of which may be easily propagated by their cuttings.

I last summer received from America a paper of maple seeds; two plants from which made their appearance in autumn, and I persuaded myself more will in the ensuing spring.—1792.

Mr. CROCKER, of Frome, transmitted to the Society 20 different sorts of apples, cultivated in the West of England.

Mr. PUGH, of Shaftesbury, presented 36 kinds.

[By Mr. MORSE; of Newent.]

I have sent a hamper of fruit: we have great numbers of excellent cider fruits, but the old sorts as the *Golden Pippin*, *Redstreak*, *Redmuffs*, *Woodcock*, and *Haglade Crab*, bear very sparingly; the trees are old and decayed, and young trees grafted with these fruits succeed very indifferently: they very soon canker and die, but I cannot tell from what cause; many think it is for want of a fresh supply of grafts from Normandy, &c. If any gentleman of the Society can procure grafts of the best sort of fruits of that country, about the month of February or March, I will have them grafted on young thriving stocks. I procured a few grafts lately from thence. The sort is called *the Golden Norman*. They were grafted in March 1792, and have made shoots eight feet seven inches, are likely to make very capital trees, but have not yet borne fruit.

Apple-trees grow well in moist soils: we esteem a stiff land inclined to clay the best; the cider made off such land is preferable, and will keep better and longer than that made from sandy or light land; the cider made from sandy or light land is pleasant and good for the first year, and often the second, but is apt to get acid in long keeping. Pear trees thrive better than apples on such a soil. We esteem a mixture of apples to make the best cider; the fruit ought to be of equal ripeness, and not made until thoroughly ripe and mellow.

Old Field Pears. Good tree, bears well, excellent perry, the tree thrives in almost any soil.

Reynold's Crab. Small reddish apple, good for cider, tree grows to a good size. A loamy clay soil we esteem best for all apple trees.

Marsh Apple. Very good cider, fine growing tree, bears well.

Two Park Kernel. Fine cider, ditto, ditto.

Hardwick's Kernel. Ditto, ditto, ditto.

Green Stire. Ditto.

White Stire. Ditto, ditto, ditto.

Red Harvey. Good cider.

Never-fail. Good cider, fine tree, bears well.

Maiden's Blush.

Red-Streak, well known. Excellent cider; the sort almost lost; few graft with it, as the tree cankers and dies, and will not arrive to perfection.

Red Mufs. Ditto, ditto, ditto.

Skerm's Kernel. Fine pleasant cider, very fine upright growing tree, grows fast, bears well.

Underleaf. Good cider, rather low bushy tree.

Cherry-Cheek. Good cider, and fine tree.

Golden-Pippin, well known. Excellent cider. A neighbour of mine, Mr. Holder, of Tainton, sold two hogheads for seventy guineas; the sort nearly lost, as well as the Red-streak and Red-mufs.

Orange Pearmain. Good cider, and fine tree.

Forest Sire, yellow apple. Excellent cider. I have sold it at thirteen guineas per hhd. and the person I sold it to sold it again at 18s. per dozen bottles, that is 31l. 10s. per hhd. Fine tall tree, grows to a good size, rather shy bearer.

Black Fox Whelp. Excellent cider, and very fine tree.

Longny Ruffet. Good cider, ditto.

Red Kernel. Good cider, and excellent to mix with other fruit, as it is very high colour; very fine tree, and apt to bear.

Brandy App'le. A new fort here, said to be very good.

Haglade Crab, yellow apple. Excellent cider, good mixed with other fruit, being of high colour. Tree not very large, rather given to canker.

Woodcock. Good cider, best mixed with other fruit. Tree grows large, the fort almost gone, very few grafted, they seldom succeed well.

Green's Kernel. Good cider, very beautiful tree.

Old Harvey. Good cider, tree not very large.

Oxford Pippin. Very good cider, and fine tree.

London Pearmain. Good cider, ditto.

Dutch Quinin. Very fine cider, fine tree, rather low.

On Planting, Grafting, and making Cider.

[By the Same.]

After the apples are ground in a mill, and the juice of cider (or if crabs, the verjuice) is pressed from the rinds, stalks, core, and kernels; this is called the *must*, and should be crumbled quite small, and laid thin on a board floor to dry; for if it be laid thick, it will heat and destroy the vegetation of the kernels. To prevent its heating, it should often be turned with a malt-shovel.

Prepare a piece of ground by well digging and clearing from weeds, keeping the surface smooth; and in February or March lay the must thereon, and shovel-turn it in, that it may be two inches deep; in about six weeks the young plants will appear, and must be kept clean from weeds; let them remain two or three years in the seed-beds, when they should be taken up, and the tap-root cut off, as also some of the spreading branches. There now should be another

round prepared by double digging, wherein to the stocks, laid out in beds four feet wide; plant rows across the beds about one foot distance between rows, and eight or ten inches distance in the rows; and here three years, when they must again be the roots and tops dressed, and planted in rows about six inches distance in the rows, and three feet between but four feet is better, as it will be more room to stand between them, which should be done at least yearly, and kept clean from weeds, &c. by hoeing. Digging them twice, and pruning their roots, makes them better and stronger, and commonly rise with a very root. They are to stand in this nursery until they are of a size to plant in orchards; some may be large when ten years old, others not until fourteen or fifteen years; they may be of very different sizes, although planted at the same time. Here they are to be trained up straight, and pruned every year, by cutting off or six of the largest knots or sprays each year, any more in one year, as it would make the stock heavy and throw out more branches. This pruning should be done in the spring season, as the wounds will heal fast when the sap is rising; but if pruned in autumn the wounds will be long in healing, and be very apt to continue so for years.

It is thought to be strong for planting orchards, that they should never grow out of the way of cattle, who very often do them great injury. The size I choose to plant is one inch and a quarter to one inch and a half in diameter at the grafting place; that is about five feet six inches from the ground.

The method I pursue in planting orchards is, first lay out the ground by setting up stakes equidistant; 20 or 22 yards from

each other, I look upon as the best distance. After they are properly arranged, dig a hole considerably larger than will take the roots of the stock, that the earth may be soft and mellow for them to strike therein more freely; have your stock ready with the roots and head pruned, particularly those that were bruised in raising; place it upright in the hole. If some better mould, such as street-shovellings, or a compost made with rotten dung, good mould and lime, (lime kills the ants, which are very destructive to stocks and trees) were mixed with the soil to fill the hole, it will expedite the growth of the stock. Care should be taken to fill up every vacancy between the roots, shaking the stock well whilst filling; when filled, tread the earth down to the roots pretty hard, then have a stake four or five feet long driven sideways in the ground leaning against the stock, pointing to the west wind, and firmly tie the stock to the stake with an ozier twig, placing a hayband between the stock and the stake, to prevent galling; this will prevent the wind shaking the stock, which very often injures it, and prevents its taking root. We should then plant black thorns round the stock, to prevent cattle or sheep from brousing on, or rubbing, or peeling the stocks, which they are very apt to do, particularly young sheep. The stocks must now stand three years to take full root; at the expiration those that have made free shoots should be grafted with what sort of apples the planter may please. The best time for performing this business is in February and March.

Apples should be gathered when full ripe, and will quit the tree by gentle shaking; if gathered before ripe the cider will be rough and hard, and seldom pleasant or good flavoured. Lay them on the ground in a fruit yard, better if upon a gravel walk, as the wet will run from them and they will lie dry in the bottom; should not lie thicker than ten

or twelve inches, and are better kept without than within doors. Care should be taken to place fruits of equal ripeness and good qualities by themselves; for if of different ripeness the cider will be apt to ferment too much, which will cause it to grow hard, and never be rich, full, and fine-flavoured. When the fruit is thoroughly mellow, it must be committed to the mill for the purpose of cider-making, made with a stone chafe and roller, something similar to a bark or a sugar-mill. The roller drawn round the chafe by a horse. Here it should be ground to a pulp, that no bit of apple may be seen, and untill you cannot hold it in your hand, if you take a handful and squeeze it; the kernels and rind will then be well broken, and will give the liquor a fine flavour. Let it be put into tubs or hogsheds with one head out, and remain there two days, then press it through hair-cloths. I use fourteen or fifteen, putting about two pails full in each, turning up the sides and corners; then put another on until the whole are filled, when press it with a screw; put the juice into hogsheds; after it has been there a few days it will work and throw up a thick substance at the bung-hole, somewhat like barm, but of a darker colour; when this appears it generally is dropt fine, and should be immediately racked into a clean cask; for if the substance be suffered to fall, the grounds from the bottom will rise, and the whole will be in a ferment and very foul, and perhaps must be racked three or four times before it can again be separated and got fine; and will run a risque of making the cider harsh. So long as it remains fine, and free from fermenting, it may remain in the cask, but if it ferments much it should be racked, and the grounds or lees taken from it; it often requires four or five rackings. Cider made with different sorts of apples keeps best by breaking and mixing together; but this should not be done until it is fine, when

the proprietor may blend it to his palate. After the whole is done, a bung may be placed over the bung-hole, but should not be close stoppt until February or March, when it will be fit for sale or use.

If cider do not fine, some people use isinglass. For one hoghead of a hundred gallons beat about one ounce and a half and pull it to pieces; add to it about two quarts of liquor, and whisk it together; next day add more liquor; and whisk it: repeat this until it be dissolved, and beaten fine. Rack your foul liquor, throw in the dissolved glass, and stir it together with a stick. As soon as it drops fine, rack it off into a clean cask.—*Dec.* 1791.

[*By* R. STEPHENS, *esq.*]

I comply with the request of your Committee, and shall send, next Saturday, a two-gallon cask of cyder-wine, drawn from a hoghead I had made under my own inspection, as a trial of the liquor recommended in the Bath Chronicle. I am sorry to observe the directions there given were too scanty, as very little more was said, than that two hogheads of cyder from the prefs should be boiled down to one, and kept till fit for use, and that in three or four years, according to Dr-Rush's opinion, it would become a pleasant liquor, not unlike Rhenish.—I took particular care as to the cleanness of the copper the apple-juice was boiled in, and which I had immediately from the prefs.—As soon as this juice was reduced from two hogheads to somewhat less than one, the liquor was immediately taken out of the copper, and cooled in wooden coolers. When it retained that degree of heat only, in which beer is usually worked, such a quantity of yeast was put in as I imagined would bring on a tolerably brisk fermentation—it fermented pretty strongly during the

night following, and the next morning a thick yeasty froth covered the top of the mash-tub in which it was put—the fermentation subsided towards the evening, and, if I recollect, was rather in a negative state the whole day. I think, had the fermentation continued longer, I should have made a more wine-like liquor.—*Ansford, near Castle-Cary, 1789.*

[*By Dr. FOTHERGILL, of Bath.*]

Dr. Fothergill, after analysing some cider wine made according to the method communicated by Dr. Rush, that is by evaporating it to one half, concludes that a small portion of copper is dissolved in the process. Independent of the danger (says the Dr.) of any metallick impregnation, it may be justly questioned how far the process of preparing boiled wines is necessary, or reconcileable to reason or œconomy. The evaporation of the *must*, by long boiling, not only occasions an unnecessary waste of both liquor and fuel, but also dissipates certain *essential* principles, without which the liquor can never undergo a complete fermentation, and without a complete fermentation there can be no perfect wine. Hence the boiled wines are generally crude, heavy, and flat, liable to produce indigestion, flatulency, and diarrhœa. If the evaporation be performed *hastily*, the liquor contracts a burnt empyreumatick taste; if *slowly*, the greater is the danger of a metallick impregnation.

It may not be improper to add a few observations on the present state of fruit liquors in our cyder counties, the improvement of which is an object of great importance.

When the *must* is prepared from the choicest fruit, and undergoes the *exact* degree of vinous fermentation requisite to its perfection, the acid and the sweet are so admirably blended with the aqueous, oily, and spiritous principles; and

the whole imbued with the grateful flavour of the rinds, and the agreeable aromatick bitter of the kernels, it assumes a new character; grows lively, sparkling, and exhilarating; and when completely mellowed by time, the liquor becomes at once highly delicious to the palate, and congenial to the constitution—superior in every respect to most other English wines, and perhaps not inferior to many of the best foreign wines.—It is greatly to be regretted that the capital old fruits which raised the fame of the liquors of this country, are now chiefly lost, or so far on the decline, as to be deemed irrecoverable.

Mr. Marshall, in his late survey of the orchards in Herefordshire, assures us that the *redstreak* is given up; the celebrated *fire* apple is going off; and the *squash* pear, which has probably furnished this country with more champaign than was ever imported into it, can no longer be got to flourish; the stocks canker, and decay.

The famous *Hagloe* crab, which yields a cyder that for richness, flavour, and price on the spot, surpasses, perhaps, every other fruit liquor, having been valued at 60 guineas the hoghead, is confined to a small district near Ross in Herefordshire, and will probably in a few years be extinct.

In the vale of Gloucester, (says Mr. Marshall) six quarts of cider a day is the common allowance; sometimes nine or ten quarts; or an unlimited quantity! In a plentiful fruit year cider is of very little value: men and masters are equally adepts in the art of drinking; and the tales that are told of them appear so incredible, it is to be hoped they are not strictly true. Drinking a gallon bottle full at a draught, is said (on good authority) to be no uncommon feat. Four well-seasoned yeomen (well-known in the vale) having raised their courage with the nectarious juice of the apple, resolved to have a fresh hoghead tapped; then setting foot to foot, they entirely emptied it at one sitting!!

On Maple Sugar of America.

[By Mr. CLIFFORD.]

THE Sugar Maple is a natural tree of the woods in the interior parts of North-America, and is very common in particular situations, from the latitude of 35 to 45 degrees. The result of my several enquiries led me to conclude, that trees from eighteen to thirty inches diameter (which were the sizes generally tapped) upon the average yielded about forty gallons of sap, and this quantity about five pounds of sugar. The sugar trees frequently growing on their best lands, when they wanted the ground cleared, made the farmers indifferent about preserving them, and the common mode of tapping was by cutting a notch in the tree with an axe, which was enlarged by a fresh cut every year; the sap was collected in wooden troughs made on the spot from solid logs hollowed out, and the sap boiled down in the wood in their common pots and kettles, handy to where it was collected. Where the trees were of value, and intended to be preserved, some people tapped them by boring a hole with an auger or gimblet; this was requisite to be done afresh every year, or the hole pared larger. The whole of the sap is collected in six or eight weeks, generally beginning to run early in February, and to cease by the last of March, or early in April; this being a season of the year when the farmers have little to do, enables them to pay the greater attention to it, and the expence of manufacturing being little more than their labour, at a season when time or labour is of less value to them than usual, makes it a profitable undertaking; and it is supposed, when the manufactory of pot-ashes is more generally established, the ashes arising from the fuel used in boiling the sugar, made into pot-ashes, will, by increasing their profits, tend much to increase the manufacture of maple sugar.—*Bristol, Dec. 1791.*

A TABLE of Equation of Stock, with the Correspondent Value of Land.

Bank Confol. 3 per Cent.	S. Sea Stock. 3½	Bank Confol. 4	Bank Confol. 5	India Stock. 8	Bank Stock. 7	Yearly Purchase of LANDS.	Annual Interest per cent.
3 per Cents. at 60 are equal	to 3½ at 70	80	100	160	140	20	£. s. d. 5 0 0
61½ 63	71½ 73½	82 84	102½ 105	164 168	143½ 147	20½ 21	4 17 6 4 15 2
64½ 66	75½ 77	86 88	107½ 110	172 176	150½ 154	21½ 22	4 13 0 4 10 10
67½ 69	78½ 80½	90 92	112½ 115	180 184	157½ 161	22½ 23	4 8 10 4 6 11
70½ 72	82½ 84	94 96	117½ 120	188 192	164½ 168	23½ 24	4 5 1 4 3 4
73½ 75	85½ 87½	98 100	122½ 125	196 200	171½ 175	24½ 25	4 1 7 4 0 0
76½ 78	89½ 91	102 104	127½ 130	205 208	178½ 182	25½ 26	3 18 5 3 16 11
79½ 81	92½ 94½	106 108	132½ 135	212 216	185½ 189	26½ 27	3 15 5 3 14 0
82½ 84	96½ 98	110 112	137½ 140	220 224	192½ 196	27½ 28	3 12 8 3 11 4
85½ 87	99½ 101½	114 116	142½ 145	228 232	199½ 203	28½ 29	3 10 2 3 9 0
88½ 90	103½ 105	118 120	147½ 150	236 240	206½ 210	29½ 30	3 7 9 3 6 8

On Wastes, Heaths, Inclosing, &c.

[By G. L.]

SOME land which had long been a sheep-walk, and produced only furze, heath, and mole-hill thyme, was in March ploughed ten inches deep, dragged, and harrowed ten inches deep, well dragged and harrowed to draw up the roots, &c. which were burned in heaps, and the ashes spread. In May it was cross-ploughed, dragged, harrowed, and what roots and weeds could be collected burned, and the ashes read as before. In July it was ploughed, and dressed with manure, thirty bushels per acre. In September it was ploughed, harrowed, and the rubbish burned. In October half was sown with rye, and half with wheat. In January the rye was fed with sheep, which ate it bare. In February it was again dressed with six bushels of lime per acre; the produce was five quarters per acre. The wheat yielded four quarters per acre.

[ANONYMOUS.]

About sixty years since there were in the county of Norfolk vast tracts of uncultivated land, sandy and barren, but art and industry, however, have now so altered the face of this once Arabian desert, that it wears a very different appearance. Most of these tracts are either planted, or rendered very good corn-land, or sheep-walks.—On the spots where they intended to raise new plantations from seeds and stumps, they laid on a thick coat of marle and clay, which, after being rough spread, and lying a winter in that state, was made fine, and ploughed in just before planting. By these means the soil became fixed, and in a little time covered with grass and herbage; so that there are now vast plantations of firs, oak, and forest-trees, in the most healthy and vigorous state, where within my memory ten acres of land would not maintain a single sheep three months.—1783.

[*By Mr. WAGSTAFFE.*]

I wish gentlemen to follow the example of Sir William Jertingham. The mode which he pursued, was the planting of the beech-trees from the nursery, while small, amongst Scotch firs. Many heaths beside his have been broken up and planted with firs, to much publick and private benefit; but I have not observed, unless recently, the regular intermixture of the beech at due distance. These trees, in a soil perhaps without clay or loam, with the heathy sod trenched into its broken strata of sand or gravel, under the protection of the firs, have laid hold, though slowly, of the soil, and accelerated by the superior growth of the firs, have proportionably risen, until they wanted an enlargement of space for growth, when the firs were cut down.—*Feb. 1788.*

[*From the County Surveys.*]

Cardiganshire, by Thomas Lloyd, esq. The wastes are unfriendly to cultivation, and only partially cultivated: they amount to near half the county.

Berkshire, by Mr. W. Pearce. The waste lands of Berkshire are very extensive.

Carmarthenshire, by Mr. C. Hassel. One third of it is unclofed and waste.

Cheshire, by Mr. Thomas Wedge. It is not an easy matter to ascertain what proportion of the waste lands of Cheshire might, in severalty, be profitably converted into tillage, or pasture land; there are, however, very considerable tracts which might be so converted.

Norfolk, by N. Kent, esq. There is still a considerable deal of common field land in Norfolk, though a much less proportion than in many counties.

Northumberland, by Mr. John Bailey. The extent of waste lands or open mountainous not capable of

affording profit from cultivation by the plough, are very great; considerable quantities of which are private property, and of course may be depastured by sheep or other stock to the greatest advantage; of those that are common, it would certainly be best for every man to know his own share.

Oxfordshire, by Mr. Richard Davis. There are, in most of the uninclosed parishes, either small or larger tracts of waste or down-land, which are appropriated chiefly to the feed of sheep. The most considerable, and at the same time most valuable, tract of waste land in this county, is the common of Oxmoor, situated near Islip; which contains, as near as can be ascertained, about 4000 acres, and is commonable to eight adjoining townships.

Pembrokeshire, by Mr. Charles Haffal. The waste lands of Pembrokeshire are estimated at 14,220 acres; capable of being inclosed and cultivated at a reasonable expense.

Rutlandshire, by Mr. John Crutchley. There are very few waste lands in this county.

Suffolk, by Mr. Arthur Young. I have calculated, from much information of different kinds; and from comparing and combining various data, conclude, that there are in Suffolk wastes to the amount of nearly (perhaps quite) 100,000 acres, or one eighth part of the whole; comprehended under the terms sheep-walk, common, warren, &c.

Surry, by Messrs. Macolm. Will it not be a matter of surprise, that at the close of the seventeenth century, there shall be found, in a county like this, commons and wastes of the magnitude of 96,000 acres?

Sussex, by the Rev. Arthur Young. The wastes of this county on the northern part of it are very extensive. Out of a portion of land containing 470,360 acres, they occupy no less a space than 90,000 acres of land.

Warwickshire, by Mr. John Wedge. The waste lands of this county, including the roads, I have estimated at 120,470 acres; and, like all other lands, the first step to be taken for their improvement is draining, where necessary.

West Riding of Yorkshire, by Messrs. Rennie and Brown. A considerable part of the West-Riding is waste land and moor. It may appear rash to guess at the proportion, but we think it may be computed at one sixth part of the whole. The quantity is lessening every day, as inclosure bills are frequently passed for that purpose; but still a great deal remains to be done.

Lancashire, by Mr. John Holt. In this county there are large tracts of waste lands, not less than 508,500 acres, according to Mr. Yates's statement, who took the pains to calculate the number for this particular purpose. He makes the lands under the denomination of moss, or fen lands, to be 26,500; moors, marshes, and commons, 482,000.

Leicestershire, by Mr. John Monk. Waste lands amount nearly to 20,000 acres, and the whole capable of considerable improvement.

Lincolnshire, by Mr. Thomas Stone. The commons in the Isle of Axholm, surrounding some of the most fertile, strong, loamy, soils in the kingdom, may be here justly instanced. These commons and wastes contain upwards of 12,000 acres.

Cumberland, by Mr. George Cully. The extent of waste lands in this county is very great—of mountainous pasture, 342,000 acres, which we suppose not capable of improvement from the plough; yet many parts of these districts might be applied to planting with considerable advantage, and would probably in this way make a better return than if the soil had been in such a situation as to admit of being converted into tillage.

Essex, by Messrs. Grigg. Our waste lands including the refts may be estimated at full 15,000 acres.

Survey of Kent, by Mr. John Boy. The commons and waste lands of West-Kent form an extent of many thousand acres, which at present produce very little; tho' under proper systems of management they might undoubtedly be made of great value.

Bedfordshire, by Mr. Thos. Stone. The town of Bedford chiefly surrounded by common fields, the soils of which are of the most improveable nature by means of inclosing, hereby the barbarous practices of the common fields might be abolished, and the soil applied successfully to the purposes of improved cultivation.

Buckinghamshire, by Messrs. James and Malcom. From the extent of the county, it might have been expected that much greater portion of waste-land would have been met with. It does not, however, appear to be above 6000 acres; quantity very inconsiderable indeed, compared to what is found in other districts.

Hampshire, by Messrs A. and W. Driver. The total quantity of waste-lands in Hants, exclusive of the forests, but including 5,675 acres in the Isle of Wight, is supposed to be 104,845 acres.

Durham, by Mr. Joseph Granger. The waste-lands are situated mostly in the western parts of the county, and may, by probable conjecture, amount to 130,000 acres, and being of different qualities, are capable of various improvements; much may be converted into arable, much into pasture, much into wood-land, &c.

North-Riding of Yorkshire, by Mr. Tuke, jun. Though this riding possesses some extensive open arable fields, yet upon the whole the quantity is not large, and they are fast becoming annually lessening by inclosures under acts of parliament.

Derbyshire, by Mr. Thomas Brown. Within the last fifteen years, I believe that above one-fourth part of the whole county of Derby has been inclosed—the two districts which I have denominated *fertile* and *low peak*, are almost entirely inclosed; the *high peak* remains a field in many places for that improvement.

Dumfries, by Mr. Bryce Johnstone. Formerly there were several commons (or commonities as they are called) in this county. But some years ago, the greater part of them were divided among the surrounding heritors, (proprietors of land) in proportion to the servitudes, which the dominant tenements had upon the common, for the years of the long prescription, according to the law of Scotland.

Staffordshire, by Mr. Wm. Pitt. The waste and unimproved lands of this country are very considerable; and certainly, in the present state of population, their cultivation and improvement are very much a national object.

Worcestershire, by Mr. W. Pomeroy. The waste-lands in this county contain, at a very low computation, from 10 to 20,000 acres: the medium 15,000.

Monmouthshire, by Mr. John Fox. The quantity of rich land lying in commons on the marshes is very considerable; and also upon hills there is much waste land, to the amount of many thousand acres.

Flintshire, by Mr. Geo. Kay. Although small portions of the waste-lands have lately been divided and enclosed, yet there are many thousand acres still left in their original state.

Anglesea, by Mr. George Kay. The commons, or waste-lands, are computed at 5,000 acres, and no division of them is as yet proposed.

Caernarvonshire, by Mr. G. Kay. All the mountains in Caernarvonshire, and also some parts of the low ground on

the west side of the county, are *commons*; the mountains are chiefly depastured by sheep, and the low grounds by black cattle.

Montgomeryshire, by Mr. G. Kay. Full one half of Montgomeryshire, I was informed, consists of waste-lands, or commons, which are chiefly depastured by sheep, and innumerable ponies, with a few cattle; and here, as in other Welch counties, the commons are all denominated mountains; although some extensive tracts are to be seen, as far as the eye can reach, without the obstruction of a hill of any consequence.

Merionethshire, by Mr. Geo. Kay. The waste lands in Merionethshire are of very considerable extent, and by embanking and draining in some places, and by draining alone in others, might be converted into fine pasture, or hay lands.

Denbighshire, by Mr. G. Kay. There are no common arable lands in this county, but several commons to a great extent, at present depastured by the cattle and sheep belonging to the adjacent tenants.

Hertfordshire. There are several small commons and wastes from 20 to 50 acres, and some considerably larger; the whole may contain 4,500 acres.

Northamptonshire. Though there is not one acre of waste land in this county properly so called, yet there are many thousand acres in the open field lordships in a state of common pasturage.

[By W. F.]

I have read above thirty of the surveys lately made for the Board of Agriculture, many of which are well written, and contain much valuable information; they all agree that a commutation for tithes, a general inclosing bill, and the granting of leases, are essential to any great improvement in the cultivation of lands in this island.

[By BENJ. HOBHOUSE, *esq.*]

What prevents many parishes from applying to Parliament for permission to inclose their commons and wastes is the expence of soliciting for a bill. This expence is so heavy, that to inclose a parish, unless it be very large, is but to buy land rather cheaply; and to inclose a small parish, is to consume the fee-simple of the uninclosed lands. Let a motion be made in the House of Commons for a reduction of the fees of office; and let it be proposed that two-thirds of them, or any other proportion which may be thought more proper, shall be abated in all cases where the property to be inclosed shall, by a valuation signed by an able and respectable judge of land, such as Mr. Billingsley or Mr. Davis, appear to the Committee of the House appointed to frame the bill, to be worth no more than ——. I leave a blank for the sum, because it requires more time to fix it than I can at present bestow.—*OE.* 17, 1798.

On DRAINING.

[By Mr. ANDERSON, *Cotfield, near Edinburgh.*]

IT is now twenty years since a book, entitled, “*Essays relative to Agriculture and Rural Affairs*,” was published by me; and if you will take the trouble of turning to the second essay in that work, which is, *on draining bogs and swampy ground*, you will there find the method of draining, by means of *tapping*, which has since been practised by Mr. Elkington. After describing the effects of tapping by sinking *small pits*, and explaining the circumstances which will render it effectual, it is added: “I have often imagined that the expence of digging these pits might be *saved*, by boring a hole through

this solid stratum of clay with a large wimble (an auger) made on purpose; but as I never experienced this, I cannot say whether it would answer the desired end exactly."

A Mr. Brodie brought forward, what he calls *the Patent Bath Stove*, the principle upon which that stove is constructed having been explained, and clearly illustrated by means of a plate, in a treatise of mine on smoaky chimnies, that was first published in the year 1769; but this particular was little adverted to for several years, until Mr. Brodie, by a little *proper management*, brought it into notice.

On TITHES.

Survey of Berksbire. WITH respect to *tithes*, the practice generally followed in the present mode of inclosing, of "allotting land in lieu of them," is certainly a good one; and preferable to a corn rent.

Carmarthenshire. Among the obstacles to improvement in this county may be stated the local prejudices of the common farmers, and the present mode of paying tithes in kind.

Chefbire. In speaking of *obstacles* to general improvements, the present impolitic, and in many instances, oppressive mode of collecting *tithes in kind*, must present itself first to notice.

Northumberland. In our journey through this county, we found that the payment of tithes in kind was considered as the chief obstacle to improvement.

Pembrokeshire. Another impediment to improvements in agriculture is the present mode of paying *tithes*.

Surry. The second obstacle to improvement is the payment of tithes in kind.

Warwickshire. Having spoken of waste lands, it may be proper to mention tithes in kind, as a great, and in some cases an insurmountable, obstruction to their improvement.

Yorkshire. The next obstacle to improvement is the collection of tithes in kind; or by an annual valuation.

Lancashire. Tithes are universally acknowledged as obstacles to improvement.

Leicestershire. The payment of tithes in kind is an obstacle to improvement.

Isle of Man. A method of maintaining the clergy, less unpopular than taking the tithe in kind, would excite the farmers to improve, and grow a considerably greater quantity of corn than they now do.

Cumberland. It seems universally agreed, that the payment of tithes in kind is a material obstacle to the advancement of agriculture.

Effix. Another hindrance to the improvements, which men of property and spirit might otherwise make, particularly in regard to waste and uncultivated land, is the present mode of rewarding the labours of the clergy. Could the honourable Board suggest some fair equivalent, which would make that most valuable member of society, the farmer, secure in all the just gains of his laborious endeavours, without injuring the legal rights of the church, it would confer the most substantial benefit on the landed interest in general, assist morality and good neighbourhood, and give comfort to the tithe-gatherer, as well as to the landlord and the husbandman; all of whom, were the subject properly understood, it would not be difficult to satisfy.

Kent. If a fair commutation for tithe could be devised, so as to satisfy all parties, there can be no doubt but that the produce of this island, great as it already is, would be much increased by the additional crops that would be raised on these barren spots, which would be an advantage to the community in proportion to the additional stock of productions.

Buckinghamshire. Tithes are every where considered as a leading obstacle to improvements in agriculture.

Hampshire. Tithes are a subject of great national importance, and which, if properly adjusted, would prevent much discontent on both sides, which is now daily the cause of disputes and litigation.

North-Riding of Yorkshire. The taking of tithes in kind, or advancing the rent of them as improvements are made, are a great obstacle to improvements.

Derbyshire. The collecting of tithes in kind has a tendency to damp improvement; but on one of the largest estates in the county of Derby, the agreeing for the tithes is left entirely between the clergy and the occupiers of the land; and although this is not the case on many other estates, yet it is a matter of fact, that no estate in the county is in a better state of cultivation and improvement.

Gloucestershire. In the new inclosures, tithes have been got rid of by giving up a part of the property in lieu of it. One-fifth of the arable, and one-ninth of the pasture, and in some instances, two-ninths of one, and one-eighth of the other, has been asked, and agreed to.

Hertfordshire. Where the land is *tithe-free*, and occupied by the owner, his interest, (if he knows it) and that of the publick, exactly tally; the land will be brought to, and continued in, a proper state of manurage.

Worcestershire. If the payment of tithes in kind, and mortmain tenures, are found obstacles to improvement, might not such obstacles be removed, by a law, enforcing a composition for tithes, to be assessed, not by the value of any particular estate, but by the average value of a considerable district, and re-assessed at different periods.

Monmouthshire. Tithes are very unequally paid in this county, and the present mode of collecting them in kind,

throughout many parishes, disturbs the harmony of society, and checks agricultural improvements.

Caernarvonshire. In some places of this county hay is tithed, in other places it is not. Corn is always tithed, which is considered a great bar to agricultural improvements.

Denbighshire. The drawing of tithes in kind is peculiarly discouraging to agriculture, as it not only affects the tenant, but even the proprietor himself, who must, on this account, forego many attempts he could have made in improvements with profit.

Northamptonshire. The collecting the tithes in kind is very generally complained of, and in parishes where that mode is adopted, it certainly operates very powerfully against the introduction of improvements in husbandry.

[By Mr. PRYCE.]

A commutation of tithes for land has many advocates, and some very able opponents. The Lord Bishop of Salisbury, in a late excellent charge to his clergy, has amongst other important matters shewn, with great strength of argument, that such a commutation is by no means eligible.

COMPOSITIONS.

The fluctuating value of money, and the very small proportion which modusses, or real compositions, made previous to the disabling statute 13 Elizabeth, now bear to the value of tithes then compounded for, are convincing proofs that no pecuniary payment can be fixed, without the greatest probability of injuring posterity. To remedy this evil, provision-rents have formerly been adopted. But a moment's consideration will convince us that a commutation of tithes for provision-rents, or the produce of the land in a marketable state, would be liable to much trouble and abuse. It would

not be eligible even for the farmer ; nor can it be expected that the tithe-owner would ever consent to it.

The worthy and learned prelate before-mentioned, with equal judgment and philanthropy, recommends to his clergy to compound with their parishioners on *moderate* terms.— Were this salutary advice universally adopted, it would be for the benefit both of the clergy and the laity.

Composition to vary with the Value of Money.

The most unobjectionable commutation that occurs to me, is that of a money-payment, chargeable on the occupiers of the land now titheable, but to vary with the value of money, in such manner as for the same income to purchase the same quantity of the necessaries of life, in times to come.

In order to accomplish this end, it is proposed, that a bill be brought into Parliament, not to compel every parish to enter immediately on such a measure, but to enable all parties, who are desirous, to proceed on the business. A very sudden and general change would neither be practicable, nor eligible. It must inevitably be a work of time ; and should be carried on rather from conviction than compulsion. The following hints may probably be of some use in framing the principal clauses in a bill for that purpose.

Mode of Proceeding.

That every thing may be transacted in as short a manner, as openly, and at as little expence as possible, the justices at their general quarter-sessions of the peace, held for the same county, and at the nearest distance from the parish where the tithes are proposed to be commuted for, should be enabled to authorise commissioners to proceed on the business. Whoever has attended the passing of private bills through Parliament, must have observed, that although the allegations of a bill are proved before a committee, with due care

and solemnity, yet the real merits and most material parts, are sometimes but imperfectly understood, or attended to. At a general quarter-sessions, it is probable, that several of the magistrates may be well acquainted with the merits and circumstances of the business, and the expence of attendance will not debar the parties from coming forward with the best evidence that can be obtained.

Proper notices should be given. The proportion of consenting parties should next be brought forward, and the reasons given by those who withhold their assent should be particularly stated.

The parties interested in the tithes, or those whose consent ought to be obtained, are the bishop of the diocese, the patron, and incumbent—appropriators holding tithes, and impropiators, with their respective lessees for long terms renewable or for lives.

On the part of the land-owners, the consent of the proprietors of three-fourths of the property in quantity or value should be obtained, previous to such application to the quarter-sessions. But no person who consents or dissents as diocesan, patron, incumbent, or tithe-owner, should have any vote as land-owner also. If any opposition be made to the measure, the parties opposing should be heard by themselves or counsel; and if the magistrates are not unanimous, in order that friendship or party may have no influence, the question should be determined by ballot.

Three commissioners, who are men of judgment, integrity, experienced, and disinterested, will transact business much better than a larger number. The act of any two of them should be binding.

In the first place the commissioners should give ten days notice at least, in some country newspaper which circulates in the neighbourhood, of the time and place of their first

meeting, and should also give like notice in the parish church immediately after divine service, on two Sundays previous to such meeting; and require that all persons possessed of, interested in, or claiming, any tithes or modusses, lands titheable or exempt, do attend, and give in a particular account of the same.

If any modus is set up or claimed by one party, and denied by another, the commissioners should in this, as in all cases brought before them, be empowered to examine witnesses upon oath.

Any of the parties who conceive themselves to be injured, may have liberty to appeal at some general quarter-sessions.

On the present establishment, the clergyman has a right to his tithes as soon as severed and divided into proportionate shares. He is in no danger from the failure of any tenants, except those of his own choosing. It should therefore be provided, that whenever a landlord shall seize for rent, the tenant's effects should be answerable for one year's composition to the tithe-owner; who should also, equally with the land-owner, be entitled, to his remedy by distress. But as this remedy is such a one as every man of feeling, and particularly a clergyman, would wish to avoid, it would be proper for him to have the privilege of calling on his parishioners to nominate, at a vestry two collectors, for whom they should be responsible. The clergymen to allow them three-pence in the pound for collecting. If the collectors of the land-tax were to be appointed for that purpose, it would be but little additional trouble, and would make it worth their attention.

As the value of money or of the necessaries of life rise or fall, on an average, so shall the payment for tithes rise or fall in like proportion.

Suppose the clerk of every principal market throughout each county was, once a year, at the court of general quarter-

sessions, held the first week after the Epiphany, to give in upon oath the average price of a bushel or quarter of wheat, on each market-day, in the several months of October, November, and December.

[By Mr. DAVIS.]

There are two kinds of compensation that can be given for tithes, viz.

- 1st. An equivalent in the gross; and
- 2^{dly}. A yearly commutation.

An equivalent in the gross may be given in two ways, viz.

- 1st. By obliging the tithe-owners to *sell* their interest to the landholders for a valuable consideration in money; or,
- 2^{dly}. By obliging the latter to give *land* to the former of equal value with the value of their tithes.

The former has always been thought, and perhaps properly, too great a stretch of power even for Parliament to attempt. The latter is frequently done under inclosure acts in parishes where every proprietor has sufficient *commonable lands* to give for the exoneration of the tithes of all his property in that parish; but is frequently and indeed generally impracticable in parishes where the lands are already inclosed.

A yearly commutation in money may also be given in two ways, viz.

- 1st. By a *permanent* yearly money payment.
- 2^{dly}. By a payment in money, to be *varied* from time to time, according to the variation of the *value of the articles out of which the tithes arise*.

The former has been sometimes directed in inclosure acts, but is objectionable, on account of the continual fluctuation in the *value of money*. The latter is the mode most commonly directed by Parliament in inclosure acts at this time

or settling commutations for tithes; and the variation of its yearly payment is in general directed to be regulated by the variation in the prices of *wheat* in the London Gazette. The latter mode may therefore be said, not only to be the most exceptionable, but is, indeed, perhaps the only practicable mode by which parishes, already inclosed, can be liberated from tithes.

But whether the price of *wheat* alone be a proper ratio which to fix the value of *all* tithes, is a matter deserving serious consideration.

The writer of this, who has been long and actively employed under inclosure acts, is of opinion that it is not; and, shall proper deference to the wisdom of the legislature, who have hitherto directed that ratio to be adopted, venture to state the following reasons for his opinion:—

The tithes of this kingdom arise chiefly from the following articles, viz.

Corn, viz. wheat, barley, oats, pulse, &c.

Hay, including clover, vetches, &c.

Cows, viz. calves and milk.

Sheep, viz. wool and lambs.

Underwood.

Pigs, Poultry, &c.

It is not only evident that the price of *wheat* does not govern the price of all the other titheable articles above enumerated, but it is as evident, that the price of wheat fluctuates less than *any other necessary of life*, if taken on an average for any twenty years together; it having been the policy of the government of this country to keep the price of so indispensable an article as steady as possible, by importing it from other countries when it is *dear* in this, and by giving a bounty on its exportation when its price at home is too *low* to pay the expence of growing it.

Any ratio for the tithes of the last-mentioned articles, which was settled in the last century, and deduced from the price of wheat alone, must therefore *at this time* be an unfair commutation for the tithes of many other titheable articles.

No commutation for tithes can be called a fair equivalent, which is not so settled as to fluctuate with the rise and fall of every commodity subject to tithes; so as to be in fact, a fair yearly rent for *each year's tithes*, or as nearly so as the nature of the case will admit.

The ratio of a commutation should therefore be deduced from *all* the several articles out of which tithes arise, or at least from *such of them* as are of the greatest consequence, and which, in a great degree, influence the price of the rest; and some standard, as simple in its operation as possible, should be fixed upon, by which the owners of tithes may make *such* a commutation as will ensure them and their successors, *from year to year for ever*, the same income as would have been received from the *tithes themselves*, in case such commutation had not taken place; or as nearly so as the nature of the case will admit.

The principal titheable produce of arable land being, as is already stated, wheat, barley, and oats; the commutation for the tithes of arable land should be regulated by the value of *all those sorts* of grain; and those values could be as easily deduced from the London Gazette, as the value of wheat alone.

Thus would the tithe-owner be paid the *real value* in money for the several titheable articles, which he would otherwise have taken in kind. And, as the price of the other common productions of arable land is, in a very great degree, influenced by the prices of these principal kinds of grain, it is fair to infer, that a ratio for the other productions of arable land, deduced from these prices, would be a fair equivalent for the tithes of those productions; and particularly

so, when taken on an average of some years together. And the possible effect which future regulations may have with respect to the importation and exportation of corn, which it is impossible at this time to foresee, is an additional reason why no conclusion can be drawn, that the *different kinds* of grain will hereafter bear the *same relative prices* as they now do; and consequently, that no ratio deduced from the price of *one* kind of grain can be infallible with respect to the other kinds. So far there appears to be no great difficulty in finding a proper standard with respect to the common productions of arable land; and with respect to the more valuable articles, such as hops, hemp, flax, &c. of which the production is local, it would not be difficult to ascertain their value, and fix a local ratio by which to regulate the tithes thereof.

But with respect to the tithes arising from grass land, and stock of all kinds, there seems to be a much greater difficulty. The principal titheable productions of this kind are, hay, calves, lambs, wool, and milk; and the *quality* of these is so very different, and the *price* so variable and fluctuating, and so much influenced by *local* circumstances, that it is next to impossible to keep a *fair* register of prices of *every* article.— But it is possible that we may find *some one* commodity of a constant invariable quality, and of daily, regular, and indispensable consumption in quantity; on the price of which, the price of every other production of grass land in a great measure depends.

I contend, that this article is *butter*, by which I mean butter made from the pure cream of milk; and I contend, that this article is the least variable in its quality, and of the most constant, regular, daily, and least varying consumption in quantity, of any other titheable produce of grass land; and that its price has kept a more regular progressive proportion with the price of the land from which it arises, for these two

last centuries, than any other article whatever; and of course is likely to make a proper standard, by which the value of tithes arising from grass land may be regulated for time to come. Besides, the sale of butter being chiefly confined to great towns, an account of its prices is more easily kept, than of almost any other article.

That the justices of the peace for each county should, yearly, at their Epiphany sessions, publish an account of the average prices of *wheat, barley, and oats*, and also of *milk-butter*, taken from the London Gazette for the year preceding, for that county. *And that the difference in the prices between the year then last past, and the year in which the commutation was made, should be the ratio by which the tithes to be received from every landholder should be regulated for the year ending at the ensuing Easter*; in like manner as commutations are now settled and regulated daily under inclosure acts, *by a ratio deduced from the price of wheat alone.*

It may be said that the price of the tithes, when once settled, might remain the same for *more than one year*. I answer, that as the many parishes which now pay rents of this kind in lieu of tithes, and the many others yet remaining to be settled, must necessarily begin from different periods; it follows, that the justices *must* make a return *every year*. But the tithe-owners and the tithe-renters are *not obliged* to alter the terms every year; but may, if they think proper, make agreements for *three, seven, or fourteen years*, or for as long time as their respective interests shall continue.

With respect to the tithes of such valuable articles as hops, hemp, flax, &c. the legislature may fix a fair price per acre for each, and such as would not be sufficient to prevent the cultivation of those articles in land naturally adapted to them. And whenever a general commutation takes place, the rise and fall thereof might follow the average price of *corn*; as it

y the price of *corn* that the growth of those articles is at
ent in a great degree regulated.

Mr. Pryce having, in his very ingenious essay on this sub-
(already published by the Society) pointed out minutely
process which he apprehends would be proper to be au-
rised by Parliament to carry commutations into general
t, and Parliament having in many instances done him
the Society the honour of adopting many parts of his
in commutations under inclosure acts, it will be need-
to add more here on that subject.

[By Mr. PRYCE.]

The principle laid down in Mr. Davis's essay, that, "No
mutation for tithes can be called a fair equivalent,
ich is not so settled as to fluctuate with the rise and fall
every commodity subject to tithes, &c." is not, I think,
ll founded; because, the rise and fall of commodities is ge-
ally occasioned by the plenty or scarcity of them in mar-
. It would not therefore be equitable, that the rents of
es should be lowered by particular years of great plenty,
en the increased quantity makes amends for the decrea-
price; and it would be equally unjust, that those rents
uld be advanced in consequence of high market-prices,
asioned by years of general failure and scarcity.

Mr. Davis has adopted the article of Butter as a regulator
the rents of tithe on all the grass land in the kingdom.

considers butter as a "commodity of a constant and
variable quality, and of daily, regular, and indispensable
sumption in quantity, on the price of which every other
duction of grass land in a great measure depends." Other
icultural surveyors hold a different opinion.

Mr. Turner, in his survey of Gloucestershire, accounts it an article not strictly *necessary*; and Mr. Bishton, in his survey of Shropshire, expressly treats it as an article of *luxury*. In whatever light the Society shall please to consider this commodity, it seems to have but little influence on the prices of various other valuable productions of grass land. There seems to be but little connection between the price of butter and the prices of wool and lamb, which are seldom produced, in considerable quantities on land fit for the dairy; nor is the demand influenced by similar causes. The price of hay is determined more by the length and severity of the winter, than by the price of butter. Hay must be had for the support of valuable animals; butter may be dispensed with, or the quantity lessened.

It must have occurred to every accurate observer, in common with the late ingenious Mr. Wimpey, that most markets are supplied with butter by such *little dairies* only, as are thought "below the notice of the wholesale dealers."

Whether the price of butter has kept a regular progressive proportion with the price of the land from which it arises, as stated by Mr. Davis, is much doubted. I have reason to believe, that it has advanced in a higher ratio. I am equally unfortunate in differing from Mr. Davis, whose general sentiments on rural matters I highly approve, by thinking that the rent of tithes, when once fixed, ought not to be disturbed every year. It is not because wheat is *one* of the principal productions of the land, that I have, in my former essay, chosen it for a standard: it is on account of its being *an indispensable necessary of life*.

ENQUIRIES concerning POPULATION.

[By Sir JOHN CALL.]

INDPENDENT of the destruction of cattle by the hard frost in 1794, and the succeeding deficient crops of corn, as well as the additional consumption by Emigrants, French prisoners, and the extra provisions requisite for the and sea forces; many persons, curious in their enquiries, thought there were radical causes, which occasioned greater usual consumption both of bread-corn and butcher's meat; especially as an increased importation of the one (instead of exportation) had taken place since 1774; and the one of the other had been increasing since 1782.

These circumstances, notwithstanding the general and singular excitements to an improved system of agriculture, the evident improvements which had taken place, and the evident improvements which had taken place, led on my mind a persuasion, that an increased and increasing population was the progressive and radical cause of increased price, in consequence of an increased consumption.

I therefore resolved to take the first opportunity of inquiring, by incontrovertible evidence, the actual state of the population during the course of ten years, within a small round my residence in Cornwall. For this purpose, I addressed to the several ministers of twenty-eight surrounding parishes, requesting they would indulge me with correct extracts from their respective registers, of baptisms and burials from the 1st of January 1788, to the 31st of December 1797, a correct abstract of those returns accompanied by a short note as to the extent or nature of the parish, composing the list.

The reasons before stated, which induced me to enquire into the population of the country was greatly in-

creased, I was rather led to adopt that idea by the great demand for fire-wood; the scarcity of which was every where complained of. In Cornwall and Devon, notwithstanding the encouragement to promote the growth, by a doubled price; and notwithstanding the introduction of grates, and burning pit coals in almost every town, and among the higher classes of people in every parish within ten miles of the sea coast, (where coals were never seen forty years ago) yet such was the actual scarcity of furze and faggot wood, that it could only be reasonably accounted for by an increased population, and by a greater number of fires being daily kept up.

By a table of imported and exported grain, hung up in the Treasury Chambers, it appears, that to a certain period, (which as far as I can recollect from memory, is to the year 1774) England had received a balance of about four millions sterling, or about 400,000*l.* per annum, in the latter years of that period. After this, the exports began to decline, and the imports soon gained an excess, till they amounted in these two or three last years, to about 7 or 800,000*l.* annually; so that, supposing two-thirds of the value of the grain imported to have been wheat, worth at least 5*s.* per bushel, the annual importation of late has been 3,200,000 bushels, equal to the produce of 160,000 acres of land, and to the subsistence of 533,333 people.

The progressive increase of population, according to my ideas, actually demanded such a supply of bread-corn from abroad, unless the produce of the land has been progressively increased by improvements in agriculture, or that an adequate number of acres of waste land has been brought into cultivation. The fact is, I apprehend, that these circumstances united have not been sufficient to provide for an increased consumption; and although a great number of

Inclosure Bills have been passed within these twenty years, yet they have been chiefly of common field land; and I fear by this mode, that more has been converted to pasture than has been preserved to arable. But taking the preceding data and facts as they are, and as they stand incontrovertibly, it is clearly deducible, that Great-Britain must either continue to import a considerable portion of the first article of subsistence, and thereby give an annual bounty to foreign cultivation, or that 160,000 additional acres of land must be brought into tillage; and 30,000 added yearly to that number, to provide for an annual increase of 100,000 souls in the population. Without such a resource, starvation or emigration must ensue; for I suppose no legal or political stop will be put to the increase of mankind.—*June, 1798.*

On Providing for the POOR.

[*By Mr. MATTHEWS.*]

OF the Vagrant Poor,—Those who under various pretences wander about the country without any visible means of getting a maintenance, and who furnish but too common a suspicion of their being worse than sturdy beggars, we shall say but little. As vagrants, the laws now in force provide for their being treated as they too generally deserve.

But the classes of poor for whose benefit this article is principally intended, are, the resident labourers in husbandry, manufactures, and mechanics. Such may be said to form the bulk, and the valuable bulk too, of the people in this country; to render their poverty the least irksome to themselves and to the public, and as much as possible to prevent poverty, will be allowed in every point of view to be a work of exalted charity and universal benefit. The establishment

of Provident Societies, for a provision in health against the day of sickness, has been tried, and wherever it has been tried, the effect has been uniformly good. The mode of this provision has been in its outline generally the same, i. e. by inducing the labouring classes to appropriate some small part of their earnings to a fund, from which they may draw succour in the hour of need.

Various have been the outlines of plans, submitted to the publick examination, with a view of bringing the subject before Parliament, so as to obtain a national reform by authority. But improvements by institutions of authority have long been waited for in vain. Some have held forth the necessity of large buildings under the names of work-houses, houses of industry, &c. to be established in certain districts thro' the nation, for carrying on different branches of manufacture, by means of the indigent, who should want relief; thereby supposing that such poor would be more certainly employed, more regularly superintended, better provided for, and at a cheaper rate. Others have reprobated that system *in toto*, and maintained that while such houses would be attended with an enormous expence of building, they would do nothing towards lessening the general burden; but that the poor in them, committed as to so many jails, would be rendered unhappy; their morals, from a crowded way of life, would become more corrupt; their labour would be less, and their work worse done; consequently, that manufactures would be injured; that the maintenance of the poor would cost more, and that the peasantry would be enervated by such early confinement and restraint.

Among the most ingenious of those schemes may be considered that of Mr Pew, late of Wellinborough, but now of Shaftesbury. His treatise, which is entitled *Twenty Minutes Observations on a better Mode of providing for the Poor*

seems to have been long undeservedly out of print, and not to have been known in proportion to its merit.

"I believe it may be asserted with justice," says he, "that most of the distresses of the poor in this country are more artificial than real distresses; they do not depend so much on any difficulty in procuring the necessaries or even the conveniences of life, as upon a total want of economy amongst the poor, in the management of what they can earn; it being too much the custom with them (*ultimately certain of relief from the parish*) to squander immediately all they get, be it little or much; so that our manufacturers and labourers, with very few exceptions, are equally poor at the week's end, whether they have earned in that week 11. 1s. or 5s."

"It has been my fortune to be placed in a situation, which obliges me often to visit the dreary mansions of the wretched, when the jaundiced eye of disease gives additional horror to the meagre countenance of poverty. With a mixture of sorrow, indignation, and pity, have I often seen a young man, capable of earning fourteen shillings a week, with a wife in perfect health, and *only one child*, reduced by a single week's illness to the necessity of seeking relief from the parish! whilst the furniture of his house, and the coverings of what was called his bed, were sufficient, from their filth and nastiness alone, to occasion disease in the most robust constitution. Could this extreme poverty proceed from any other cause than the most shameful mismanagement? And is it not the duty of every government to oblige such persons to be economical, whether they will of themselves or not; and to compel them, if possible, to lay up something in health and youth against the attacks of a numerous family, sickness, or age? It shall be my business to examine the possibility of putting an equitable scheme for this purpose into execution—let others determine how far

it be compatible with the spirit of the British constitution. It is known to every body, that there are in this kingdom many associations under the title of clubs, or friendly societies, the object of which is to secure to the members of them, when incapable of labour, a certain sum weekly during such interruption; of these I shall take for my example one instituted in this town* about forty years ago, upon the same principle, I believe, as most other associations of this nature throughout the kingdom: Every member pays into the hands of the treasurer one shilling every four weeks, which must be deposited for one year complete, before he becomes entitled to any relief from the society; after that period, when rendered incapable of labour, he receives six shillings per week, for the space of six months; but if his incapability continues longer than that time, his pay is reduced to three shillings per week, which he receives until he gets well, or otherwise as long as he lives. The same provision is made for those persons who are rendered incapable of labour by age; for the first six months they receive 6s. per week, afterwards 3s. It also provides for burying the dead in a decent manner, and allows for each funeral three pounds. This slender monthly contribution has been found so perfectly adequate to the purposes intended by it, that it has not only proved sufficient to defray every expence, agreeable to the conditions held out, but has also enabled the society, without risk, to return a guinea to each member every two or three years, (the number 48) retaining many pounds as Bank stock.

The person who ties my hair has been in this £. s. d.
 association for the last seven years; he has
 paid annually 13s. - - - - - 4 11 0

* Wellingborough.

Without having received any thing on account

of sickness, he has withdrawn at three several

times 1l. 1s. - - - - - £. 3 3 0

Balance paid 1 8 0

So that in fact 1l. 8s. is all that he has disbursed in the space of seven years; or 4s. per annum; a trifling sum indeed, when compared with the advantages he might, if necessary, have derived from the institution; but after all there remains in stock 36l. 11s. one forty-eighth part of which, or 15s. 1d. may be considered as his property, so that he has, in reality, in the course of seven years, *spent* no more than 12s. 3d. or 1s. 10d. per annum.* That the income of the fund may suffer no diminution or interruption, every disabled member continues to pay his monthly contribution as at other times, although he is upon the sick list.

Now if so small a contribution as 1s. in a month, or one twenty fourth part of a common labourer's wages, be sufficient for *forty years together* permanently to maintain a fund *more than adequate* to the purpose of affording to each member a comfortable subsistence when afflicted with sickness, or exhausted by age, might not a fund be drawn from the people at large upon the same principle (almost without their feeling it, when in health and prosperity) sufficient, or nearly sufficient, to support them in time of sickness or in old age? In short, may not every parish be *induced, or compelled*, to form themselves into one or more friendly associations, to which each individual above a certain age (suppose males 18, females 17) should be obliged to contribute a small proportion of their supposed income, for the purpose of supporting them when unable to get their own livelihood?

* Not above one-seventh part of the sum originally paid, three-pence per week.

Let us inquire what would be the probable effects when applied to a particular town; I shall as before take that of Wellingborough. It appears by an actual and exact enumeration, made under my direction, that the number of inhabitants residing in Wellingborough amounts in the whole to 2857; that out of these 847 males, and 1100 females, are above the age specified; the sum therefore paid by these persons would be 847 shillings, and 1100 four-pences, every four weeks, amounting in the whole to 60*l.* 13*s.* 8*d.* or 788*l.* 17*s.* 8*d.* per annum.

The expence of the poor in Wellingborough, upon the average of three years last past, appears to have been 1191*l.* 4*s.* 11*d.* from which deduct 788*l.* 17*s.* 8*d.* there remains 402*l.* 7*s.* 3*d.* or very little more than one-third of the present expences of the parish. Let this be applied to the whole kingdom, taking the expence of the poor to be, as in 1773, three millions, the saving to the nation will amount to the sum of 1,984,885*l.* sterling, a sum well worthy the attention of the legislature; and this might be raised in a manner so easy and gentle, and so perfectly congenial to the wishes of the people, as scarcely to be felt, much less complained of, by any individual, especially in manufacturing towns, where the poor are always the most numerous, and always the most wretched; since the sum here specified would seldom amount to one forty-eighth part of the artificer's wages; yet the return, in the time of his necessity, would be much greater than it would be possible for the parish to afford him, however well-disposed they might be, and however great his distress. Out of this fund every man, who is really incapable of labour, shall have a right to demand 6*s.* per week, for the first six months, should his illness last so long, and 3*s.* per week after that period, until he again becomes capable of labour; every woman shall have a right

to demand 2s. per week for the first six months, and afterwards 1s. 6d. per week, until she is again able to work. I would also wish to extend the advantages of this institution, as a matter of right, to those industrious poor persons who are oppressed by large families, to the fatherless, the widow, and the orphan.

It is with the poor man as it is with the tradesman; the latter, as long as the balance at the year's end appears in his favour; and he adds something annually to his capital stock, continues unremittingly to exert himself to the utmost of his abilities; but if, notwithstanding his exertions, the balance of trade goes against him, and he finds his capital annually decreasing, he begins at first to look into his accounts with reluctance, then neglects them altogether, and at length seeks relief in continual dissipation. So it is with the poor man; as long as he continues in perfect health, his earnings are generally sufficient to procure him a comfortable subsistence; and if he is in debt to no one on Saturday night, he lays himself down contented. Let us suppose him now afflicted with a few days' illness, that his credit is good, and he runs a little in debt; as soon as he recovers, he makes some efforts to pay it, but before he can accomplish this, a second illness overtakes himself, his wife, or his family; his debt of necessity increases, and at length arrives to such a height, that he sees it is impossible, by any exertions he can make, to recover himself; he feels hurt at the idea, his spirit is broken, and if no one for charity, or good policy, steps in to relieve him from his present dilemma, his desire of independency is lost *for ever*; he applies to the overseers for relief, and having once surmounted the pride natural to man, and been beholden (as they call it) to the parish, he is determined to get as much from it as he can; and thus, by an aggregation of such cases, the poor's rate is extended be-

and all bounds. Such is the progress of the human mind, the lower orders of society, as I have too frequently had occasion to observe."

Mr. Pew, in a letter to Geo. Rose, esq; inserted in a succeeding volume, has given the outlines of a bill.

[By Mr. HALL, Preston-Candover.]

Looking over the list of premiums of your respectable Society, I observe one is directed for the improvement of the Poor-Laws. This has put me on recollecting some circumstances, which, in the course of near twenty-five years practice as a justice of peace in the county of Hants, have occurred to me as likely to conduce much to the comfort of the poor, by making them more industrious than they are found to be at present; and also to introduce a laudable emulation and spirit of good order among that part of the community.

1st. That in a bill to be brought into Parliament clauses may be inserted to authorize the justices of the peace to order a bounty on work, in certain cases, with a view to producing better effects than by giving money to the poor.

1st. *This has been put in practice (by recommendation) for near fifteen or sixteen years past; and has been found to produce an excellent effect.*

2^{dly}. That certificates given agreeably to the Act of the 8th and 9th of King William the Third, and other subsequent acts, for the amendment of the same, be hereafter limited to short terms of years. See Gilbert's plan, 1781.

2^{dly}. *The use of this is so very obvious, and promising of improvement, that it is supposed eight or ten certificates will be granted under the limitation, instead of one in the present mode 8th and 9th*

3^{dly}. That a discriminate and special use of the badge be applied by the overseers, with the consent of the majority of a vestry, (see Cap. 30.

to appeal to the division or district justices, at their petty sessions) as a censure and punishment to the disorderly and poor only.

2dly. *It is supposed that a creditable mark or token of distinction might also be added with excellent effect. As a reward, for instance, to an industrious labourer, or an ingenious artist, who has bred up a numerous or considerable family in a reputable manner, without assistance from the parish in which he is settled. The real benefit may also be added thereto—such as, an exemption from highway duty for a certain time, or for ever, as in the case of militia-men enrolled in their own right, and not as substitutes. Other useful services to a neighbourhood may be rewarded in the same manner; as for instance, to those who prove or make discovery of persons guilty of misdemeanours, and several degrees of larcenies and felonious offences.*

Outlines of a Scheme to alleviate the very unequal burthen of Poor's-Rates, and to answer several other desirable purposes.

[By Sir MORDAUNT MARTIN.]

VHEREAS it is a common practice to take a sum of money from the father of a bastard, which contributes to lower the rates for that year, and leaves an increased permanent charge upon the parish, it is proposed to establish an office to receive these sums and all others, which it may be found expedient to allot to an *increasing fund*: such as, penalties already directed by law to be paid to the poor of the parish; those inflicted by magistrates for trespasses, &c.; that upon burying in any thing but woollen; to which might be added one upon being registered on becoming a pauper, by any other means than birth or marriage. And

an exemption to every person who should pay a halfpenny a day to it, from being removeable, till they should become actually chargeable.

Were employers to be made responsible for a halfpenny a day (or more in proportion to wages) for all labourers and workmen not belonging to the parish, and liable to pay double for neglect, with a reward to informers, it would induce occupiers of land to encourage persons to become parishioners, instead of their present endeavours to depopulate the country; the effects of which were severely felt in many places by the quantity of corn spoiled, and the exorbitant wages paid in the harvest of 1792.

Payments to be made to the parish in which the master should reside, who should employ persons to work for him in others; this would avoid disputes, and be some compensation for the number of persons (useless to agriculture) who are fixed on country parishes by apprenticeship, and service, to those who pay very little to the rates.

Monthly or weekly returns to be made to the overseers of strangers employed, and the wages they earned, and the money to be paid quarterly. The capital to be vested on similar securities to the property of Wards in Chancery.

The interest to be remitted to the clerks of the peace, who should at the quarter-sessions receive the principal sums collected by the parish-officers, and pay them the preceding interest due. To be disbursed under the same limitations as the poor's-rates are, before any rate should be levied in the respective parishes.

The accounts to be exhibited at all vestry meetings, and to the magistrates acting for each district. Whenever it shall appear to the overseers of any parish shall have more than one year's interest in hand, such surplus to be paid to the county rate.

And when any parish shall have contributed to the county rate for a specified number of years, such parish to be entitled to draw for a certain portion of its capital to repair the church, or be applied to any other work which should be recommended by such parishioners as should pay two thirds of the rates, and be approved by the majority of magistrates, who should have acted a specified time for the district; should their numbers be equal, the one who should have acted longest for the district, to have the casting vote.—
Burnham, Norfolk, August 10, 1793.

PLANS of COTTAGES.

[By Mr. DAVIS.]

IF the inhabitants of these houses are in health and able to work, they will be able to support themselves by the hire of their labour. If they are not, they become a burthen to the parishes to which they belong, and the laws will oblige the landholders to maintain them. To preserve the health and strength of these *poor*, but *necessary* fellow-creatures, is therefore not only the duty, but the interest of the landholders. Men of feeling will endeavour to do this from *principle*. Men without feeling (if such men there are) will find it their *interest* to do it. The first step towards this necessary purpose, is that of providing proper habitations for them. Humanity shudders at the idea of an industrious labourer, with a wife, and perhaps five or six children, being obliged to live, or rather to exist, in a wretched, damp, gloomy room, of ten or twelve feet square, and that room without a floor; but common decency must revolt at considering, that over this wretched apartment there is only *one*

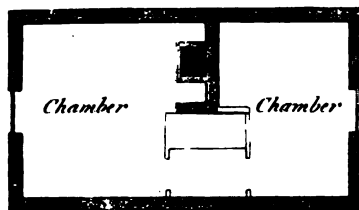
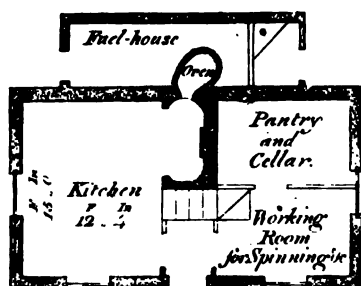
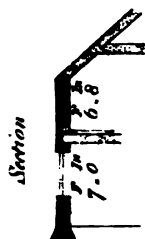
chamber, to hold all the miserable beds of this miserable family. And yet instances of this kind (to our shame be it spoken) occur in every country village. How can we expect our labourers or their families to be healthy, or that their daughters, from whom we are to take our future female domestics, should be *cleanly*, *modest*, or even *decent*, in such wretched habitations? To remedy this serious grievance, the following plans of cottages for the habitation of the labouring poor in the country are submitted to the Society.

Plans of cottages may be drawn, and calculations made to build them, at a less expence than these herewith sent to the Society; but the writer of this pledges himself, from the result of long experience, that nothing less than 50*l.* for a single cottage, or 90*l.* for two dwellings under one roof, (even in the Western counties, where materials and workmanship are cheaper than in many other parts of England) are sufficient to build cottages that are comfortable, or even healthy, or such as a humane landholder would wish to build, or an industrious labourer with a decent cleanly wife and family would, if they could possibly help it, inhabit.

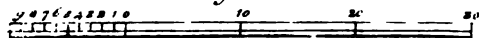
As the health of the inhabitants is certainly the first object to be considered in building houses, and as a free circulation of air is allowed to contribute very essential thereto; the lower rooms in all these plans of cottages are at least seven feet high under the beams, and the upper rooms at least six feet eight inches. And as every humane builder of cottages would wish to make them as comfortable as possible, where it can be done at a small additional expence, a chamber-chimney is drawn in the greatest part of the following plans.

The plans of cottages on the plates annexed, and hereafter described, have in part been already executed by the Marquis of Bath, part by Joshua Smith, esq; and the rest are new designs.

N^o1. Cottage with two Rooms on a Floor.



Scale of Feet.



With or Bath Sculp.

PLATE I.

PLAN
OF
A PLAIN USEFUL COTTAGE
OF TWO STORIES,

Containing three rooms below, and two above, with a
skilling behind for fuel.

The chambers lighted from the ends, by windows in the
gables, and the roof finished with a half-coot over the
windows.

ESTIMATE, 50l.

This plan is the most simple that can be contrived, to
have *two* bed chambers.

The Room, marked Working-Room, will be necessary
to spin in by day, to put by the spinning-wheels when not
in use, and in countries where there is no manufacture, will
be useful for a cleanly housewife to wash in, &c.

PLATE II.

PLAN
OF
A PLAIN USEFUL COTTAGE
OF TWO STORIES,

Containing three rooms on a floor, and a skilling
behind for fuel.

The chambers lighted from the ends.

ESTIMATE, 50l.

In this plan the size of the kitchen is lessened, to give an opportunity of making *three* rooms on the chamber-floor, where it may be thought necessary so to do.

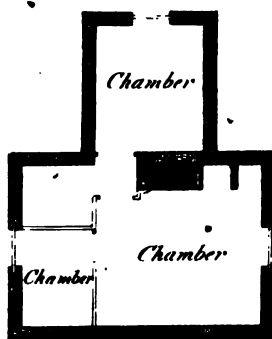
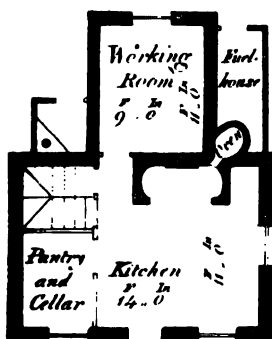
N^o 2. Cottage with three Rooms on a Floor.



*Elevation of
one end*



Elevation of Front



Scale of Feet

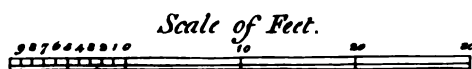
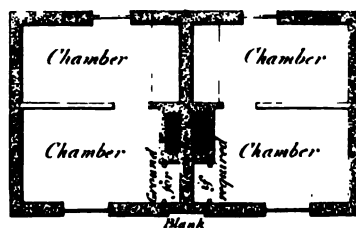
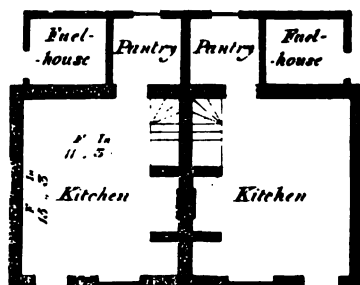
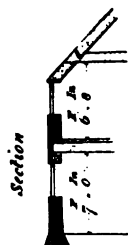


Without Bath Sculp.





N^o 3. Small Double Cottage with Skilling behind.



Robert, Bath, Supt.

PLATE III.

PLAN

OF

AN USEFUL AS WELL AS ORNAMENTAL

DOUBLE COTTAGE,

Each dwelling containing two rooms on a floor, the pantries
and fuel-houses being skillinged behind.

Or this cottage may be executed *plain*, with horizontal
eaves, and plain square chamber-windows.

ESTIMATE, 90l.

The ground plan of this cottage is the most simple, and per-
haps the smallest that can be contrived for *two* families.—
The elevation (if not approved) may be altered at discretion.

PLATE IV.

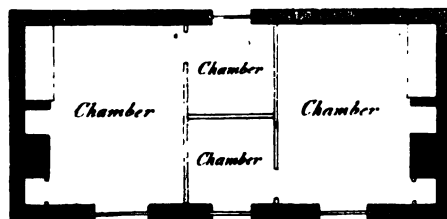
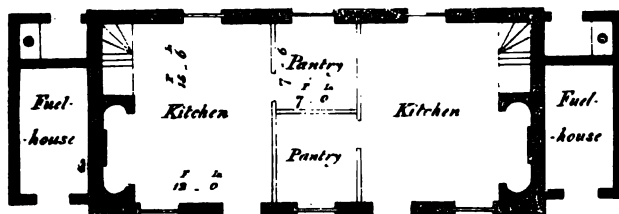
PLAN
OF
AN USEFUL AS WELL AS ORNAMENTAL
DOUBLE COTTAGE,

With two rooms on a floor, and skillings for fuel
at the ends.

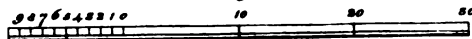
Or this cottage may be executed with plain square chamber-
windows and horizontal eaves.

ESTIMATE, 100l.

N^o 4. Double Cottage with Skillings at the Ends.



Scale of Feet.

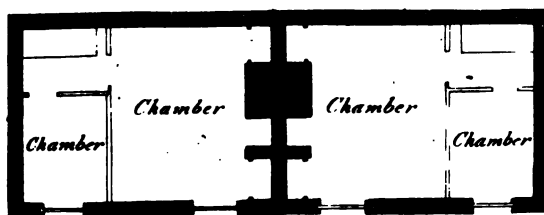
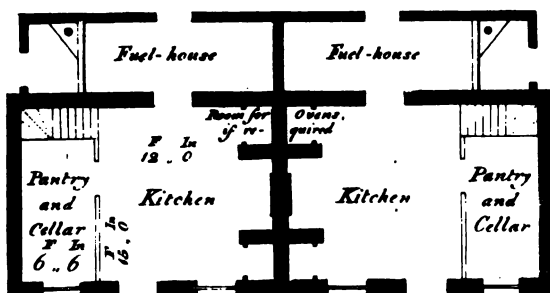
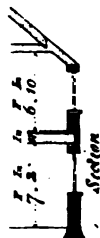


Edwards Bath. Scale.

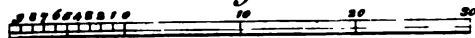




N^o. 5. Large Double Cottage with Skillings behind.



Scale of Feet.



Notes. Both Sides

PLATE V.

PLAN

OF

A LARGE DOUBLE COTTAGE,

With every necessary convenience.

ESTIMATE, 100l.

[226]

PLATE VI.

PLAN

OF

AN ORNAMENTAL COTTAGE,

Of three rooms below and two above, with a
skilling for fuel.

ESTIMATE, 50l.

PLATE VII.

PLAN

OF

AN ORNAMENTAL COTTAGE

FOR

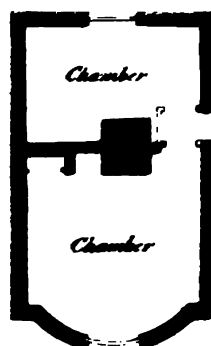
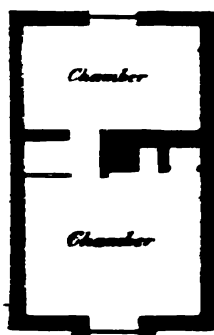
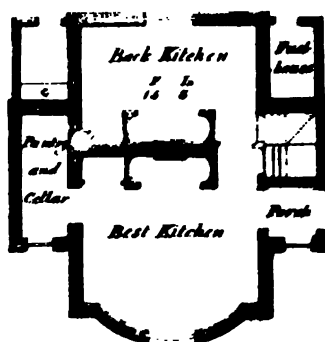
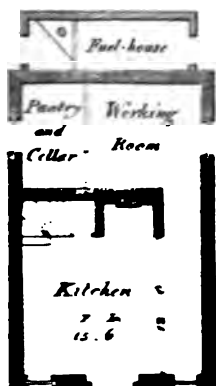
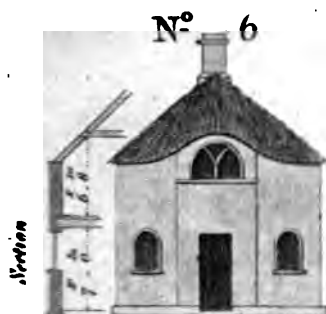
A PARK OR PLEASURE GROUND,

With every necessary convenience.

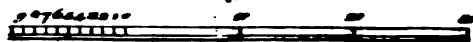
ESTIMATE, 70l.

finishing one room for tea-drinking, &c.
occasionally.

Ornamental Cottages.



Scale of Feet.



W. & A. B. B. & Co. Architects



On the UTILITY of BENEFIT SOCIETIES.

[*By a MEMBER.*]

AS I venerate every attempt, either in societies or in individuals, to promote useful knowledge, improvements in the necessary arts, and happiness in collective and civil society, I wish to point out one subject which seems in a particular manner to merit your attention and encouragement: this is, the establishment of *Parochial Friendly Societies* among handicraftsmen and poor labourers.

As these *Friendly Societies* are founded on one of the wisest maxims in the code of human policy; namely, *that it is easily in the power of the many to help the few*: I think they merit *publick* encouragement and support. Therefore, if your finances will admit, I think you cannot bestow a few guineas better than in offering a premium "to the most numerous Society of this kind, of not less than forty members; which shall be established by labourers and handicraftsmen, in any country town or parish where no such Society is at present instituted. The said premium to be claimed as soon as the said Society, of not less than forty members, has subsisted one year."

In consequence of the preceding letter being laid before the Society, John Anstie, esq; of Devizes, transmitted to the Secretary the following state of facts, to shew the great utility of a Society of this kind in that town, and of which that gentleman is treasurer.

"Scriblers Club, held at the Black Horse, Devizes.

"Cash drawn for Sick and Burials from Sept. 1765, to Sept. 1783, distinguishing each year. J. FISH, Book-Keeper.

				<i>Cash Paid.</i>		
<i>Number of Members.</i>				£.	s.	d.
1765 to 1766	—	108	—	48	0	5
1766 to 1767	—	107	—	58	15	5
1767 to 1768	—	97	—	41	10	11
1768 to 1769	—	101	—	40	17	6
1769 to 1770	—	104	—	40	18	0
1770 to 1771	—	108	—	41	2	6
1771 to 1772	—	107	—	57	17	6
1772 to 1773	—	105	—	47	14	2
1773 to 1774	—	106	—	27	11	0
1774 to 1775	—	103	—	38	9	6
1775 to 1776	—	91	—	51	1	4
1776 to 1777	—	81	—	41	12	6
1777 to 1778	—	82	—	38	18	0
1778 to 1779	—	86	—	38	18	0
1779 to 1780	—	85	—	23	6	9
1780 to 1781	—	83	—	31	0	4
1781 to 1782	—	77	—	42	6	0
1782 to 1783	—	75	—	38	15	3
Eighteen years				—	£.748	15 1

On Machines, and Implements of Husbandry.

[*By Mr. BOSWELL.*]

ABOUT three years since I found some difficulty in procuring hands to take up my Lent or Summer corn in the method usually practised in this county (*Dorset*;) that is, by forking the swarths into cocks, and raking the ground with hand-rakes by women.

I therefore had one made nine feet and a half long, and the teeth six inches asunder. Upon applying it in the place of

the plough on the breast-work, I found it answered extremely well, except that when it met with any considerable obstruction at one end, it drew the other end astant. To remedy this inconvenience, I took away the pillar (the part of the breast-work that the beam rests upon, and which is raised higher, or let down lower, to sink or raise the plough) and had another made to extend about a foot or rather more beyond the outsides of the standards, and from each end of the chain, made to let out or take up at pleasure, to each end of the pillar: this kept the rake even and steady. To my great satisfaction, I found it succeed even beyond my expectation; for by means of this breast-work, it could, like the Norfolk plough, be instantly set up or let down to the greatest degree of nicety; so that any stubble, whether cut high or low, whether very full of grass or clover, or quite clean, might be raked by it with equal facility; for the teeth being made very much curved, the lower part of the back of the teeth rests upon the ground, and the points stand out of it. The weight of the rake presses the teeth close to the ground, and the corn is gathered into the throat of the rake, without digging up the weeds or the soil. I am satisfied it might be advantageously employed in raking corn, upland hay-ground, and all sorts of feed-clover land.

[ANONYMOUS.]

I beg leave to propose to your consideration the propriety of offering a premium for the most simply constructed machine, which shall fully answer the purpose of raising water either for draining or floating land; such machine to be worked by a small running stream, where there happens to be a sufficient fall of water. And another premium for a machine capable of being worked by wind to answer the same purposes.—*Marlborough, Dec. 8, 1779.*

Description of the Model of a Norfolk Plough.

WITH A PLATE.

[By Mr. BOSWELL.]

The model of the Norfolk plough, which I now send agreeable to the request of the Society, is complete. As an explanation of its various parts may be necessary, I trust the following observations will not be deemed impertinent,

EXPLANATION:

A the tail. B the beam. C the head.

D the wood spindle. E the iron spindle.

F the wood mould-board fitted to the iron plat or turn-furrow.

G the iron turn-furrow. This part is generally cast to its proper shape.

H the share, with a socket to fit on the head, by which means it is easily taken off to be repaired.

I the side iron. K the heel iron. L the ground-raise. These three are often made of cast-iron.

M a pin to keep the mould-board at a proper distance.

N the coulter.

O O O O O O O O eight iron pieces to strengthen the joints, and those parts where the greatest power or friction is applied.

P a staple in the tail, through which the plough-line passes.

Q the beam-ring and breast-iron.

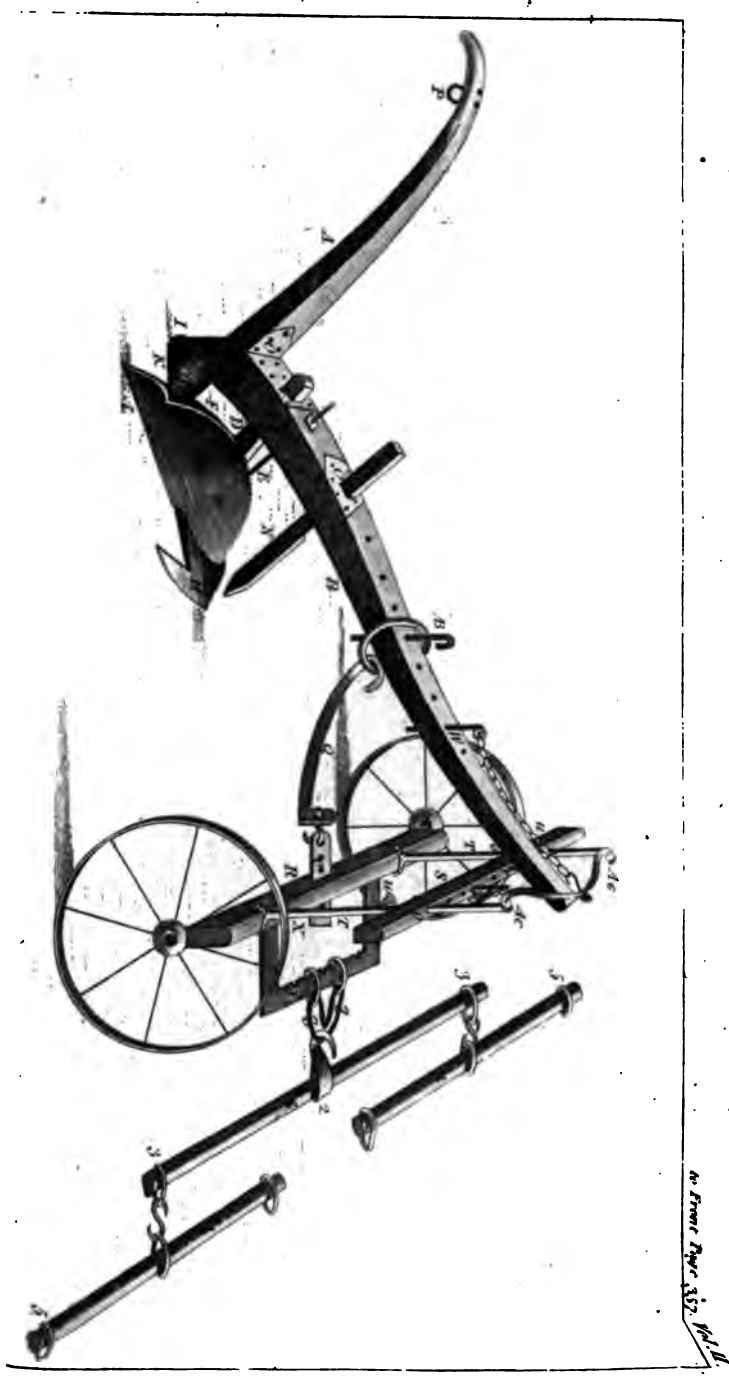
R the breast. S the pillar. T the standards.

V W pillar-pins and chains. U U standard-pins and chains.

X beam-pins and chain. X the beam-ring and breast-iron pin and chain. Y the gate. Z the heart and links.

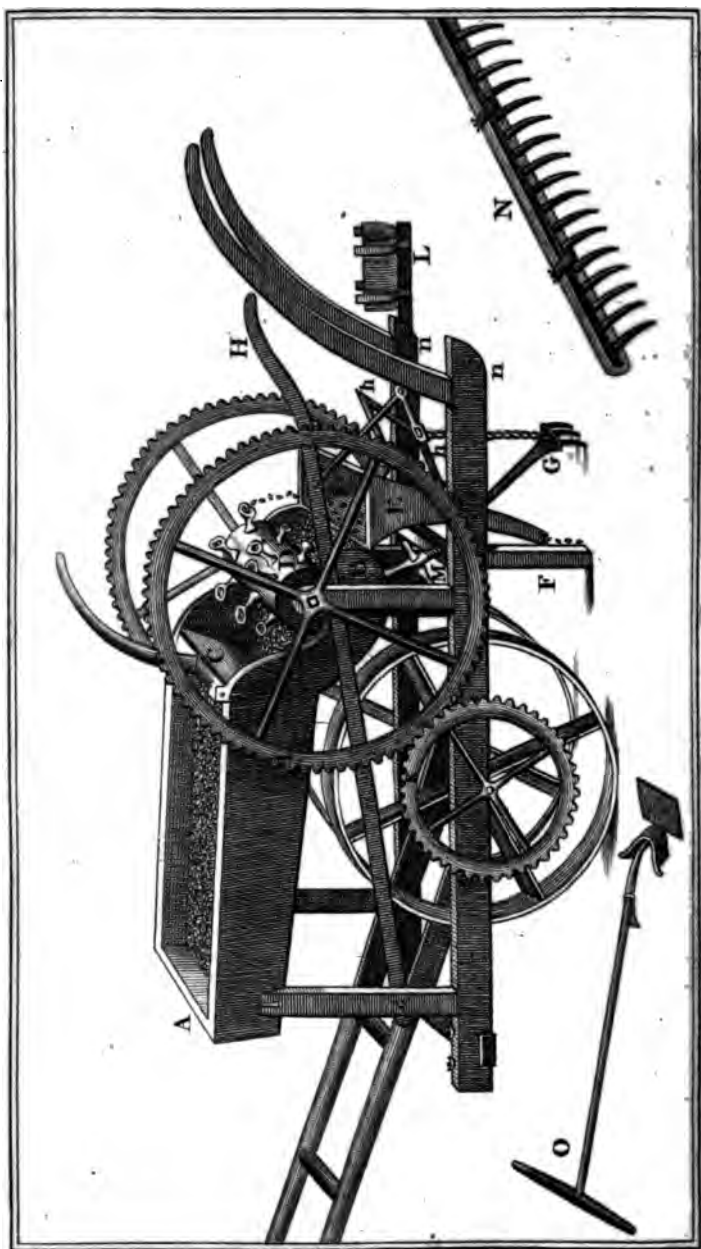
A B the beam nail. A C, A C, two holes in the standard-head through which the plough-line passes.

S the horse-tree, or bodkin, fixed by the clasp (2) to the heart (Z) on the gate Y. 3 3 two clasps on each end of the horse-tree (S) to which the hamble-trees, or weas, (4 4) are fixed, on each of which are two clasps (5 5 5 5) to receive the horse traces,



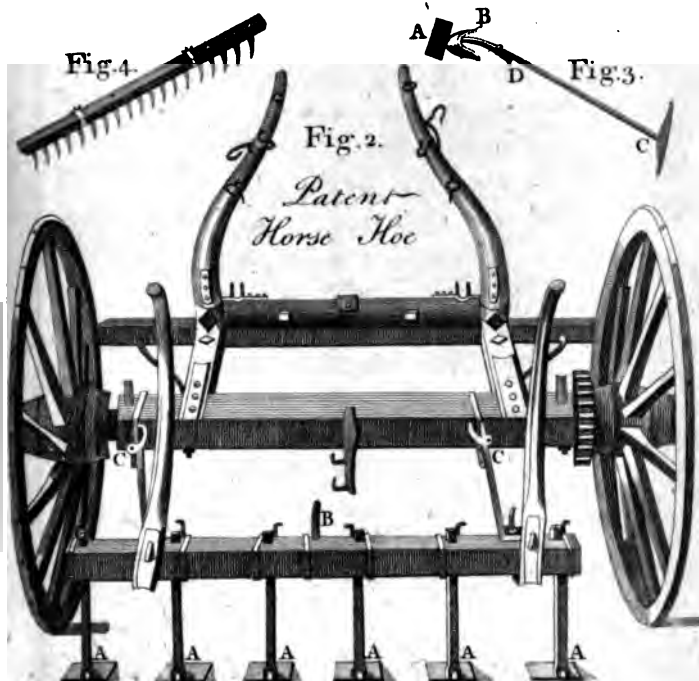
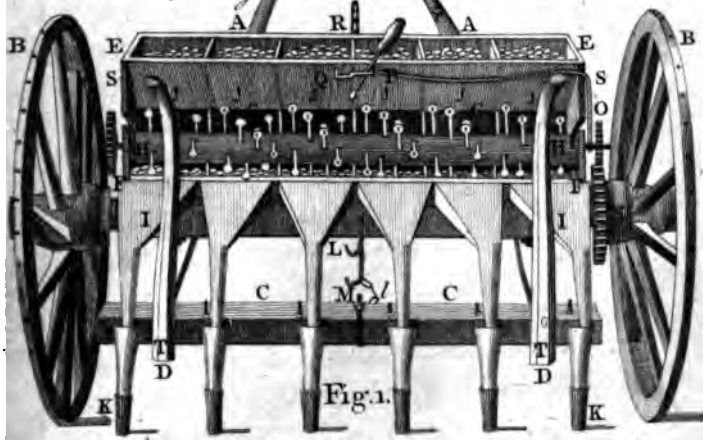
as Engine Paper 352, Vol. II.





Cooke's Patent Drill Machine

*Cooke's Patent Drill Machine improv'd & simplified
and capable of being converted into a Horse Hoe.*





References to Mr. COOKE's Drilling Machine.

WITH A PLATE.

That his new patent machine is a great improvement on his old one, and vended at the reduced price of 12l. 12s. (including the drill hoes, and sacrificators) may be obvious from a comparative inspection. But from a motive of respect to Mr. Cooke, as well as for the further information of some of our readers, we subjoin the following brief account.

The superior merits of the present improved machine, compared with the old one, consist

1st. In the wheels (B B fig. 1.) being so large, that the machine can travel on any road without trouble, or danger of breaking; also from the farm to the field, &c. without taking to pieces; requiring only half the draught which the old machine requires.

In the coulters beam (C C fig. 1. with all the coulters) moving with great ease to the right or left, on a principle of the pentagraph, by which means the drills may be made strait.

In the seed supplying itself regularly, without any attention from the upper to the lower boxes, as it is distributed.

In lifting the pin M on the coulters beam to a hook L on the axis of the wheels; by which means the coulters are kept out of the ground at the end of the land.

In going up or down steep hills, the seed-box is elevated or depressed accordingly, so as to render the distribution of the seed regular; and the seed, being covered by a lid, is screened from wind or rain.

WITH A PLATE.

The new patent machine invented by Mr. J. HORN, of Dover, will sow wheat, barley, oats, rye, clover, cole-seed, hemp, flax, canary, rape, turnip, besides a great variety of other kinds of grain and seeds, broadcast. This machine

when fixed to a plough, will drill a more extensive variety of grain, pulse, and seed, (through every gradation, with regard to quantity) and deliver each kind with greater regularity, than any drill plough whatever.

The price of the machine, to be used with a single furrow plough, three guineas and a half. If made with a spring, for sowing on the side of a hill, where the slope is considerable, but which is very rarely necessary, 5s. more. If made to be fixed to any double-furrow plough, 4l. 14s. 6d.

The large machine, fig. 2, plate 1, when made to broadcast seven furrows at a time, and to be drawn by a horse, 8l. 18s. 6d. If constructed to sow five furrows at a time, and to be used by hand 6l. 6s. These are also 5s. more, if made with a spring.—Orders to be addressed to J. Horn, the patentee at Dover; Mr. Pearson, No. 169, Fleet-street, London; or to Mr. W. Matthews, Bath.

FIGURE I.

- The machine fixed to a Kentish turn-rest plough.
- B. The apron upon which the seed falls and rebounds upon the land, in broadcasting.
- C. The lid to cover the hopper.
- D. Wheel at the heel of the plough.
- E. Strap.
- FF. Hooks, upon which the apron turns by a pivot on each side.
- G. Stay, to keep the machine steady.
- H. Lever, to prevent it from sowing.

FIGURE III.

The machine constructed to be drawn by a horse.

- A A A A. The hoppers.
- BB. The diagonal supporters,
- CCCC. The upper spouts. [spouts.
- D. The apron or shelf upon which the seed falls from the upper
- E. The lever, which carries back the bar, and prevents the machine from sowing.



Fig. 3.



Fig. 4.

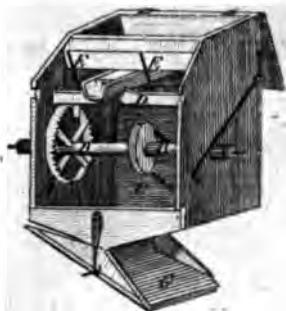


Fig. 6.

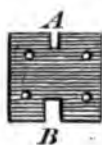
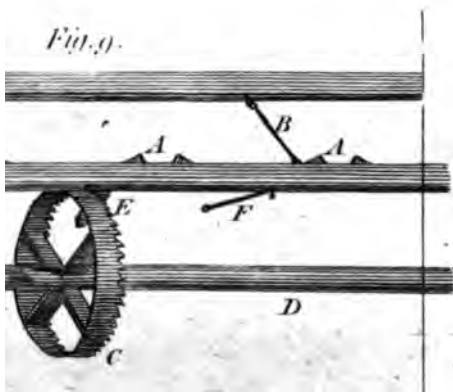


Fig. 5.



Fig. 9.



F F. Staples upon the handles, through which the reins pass, for the man who conducts the machine to direct the horse by.

I. Screw, to fix the machine occasionally.

☞ The knobs (by turning which each particular spout may be taken from off the bar, and thereby prevented from feeding) are over each upper spout, but (to prevent confusion) are not lettered in the plate.

FIGURE III.

Is the same machine with that in Fig. I. The dotted lines expressing the situation of the long spout, when the apron is removed, and the machine adapted for drilling.

FIGURE IV.

Same machine, front laid open to shew the inside.

A. The catch-wheel fixed upon the axle.

B B. The axle, upon which the machine hangs between the handles of the plough.

C. The pulley, by which the strap from the wheel at the heel of the plough turns the catch wheel.

D. The bar, upon which the upper spout rests, suspended by the diagonal supporters E E, bearing against the catch-wheel by the trigger F, and thereby kept in motion, while the plough is going.

G. The apron in a sloping position, upon which the corn or seed falls from the upper spout, and is scattered by rebounding upon the land. It turns upon pivots, and by this means throws the seed either towards the right hand or left at pleasure.

FIGURE V. The upper spouts.

FIGURE VI. The plate which is placed between the bridge and the slider, for sowing small seeds. The aperture A being downwards, for sowing turnips; the larger one B downwards, for sowing clover, &c.

FIG. VII. The bridge fixed in the upper spouts.

A. The slider, which contracts or enlarges the different apertures.

B. The aperture in the bridge, through which the seed passes, when sowing any quantity from one bushel upwards on an acre,

FIG. VIII. The regulator, made of brass.

D. The slider or horse which moves upon it, and is fixed at any particular degree by a screw in its side.

FIG. IX. represents the movement in the machine Fig. II.

A A A A. Cleets, between which the upper spouts rest.

B B. The diagonal supporters, by which the bar with the upper spouts hang.

C. The catch-wheel.

D D. The axle.

E. The trigger upon the bar, which bears against the catch-wheel.

F F. Stays from the back of the machine, by which the bar plays.

FIGURE X. The long spout.

A A. The ears by which it hangs.

[By Mr. HENRY DOBSON, Norwich.]

The following are the dimensions of a barn 50 feet by 20½ feet, and those of the model. (*See annexed Plate.*)

Dimensions of the Model.

Dimensions of a common Barn.

1475 square feet the area.

1475 square feet the area.

30,900 cubic feet for corn only.

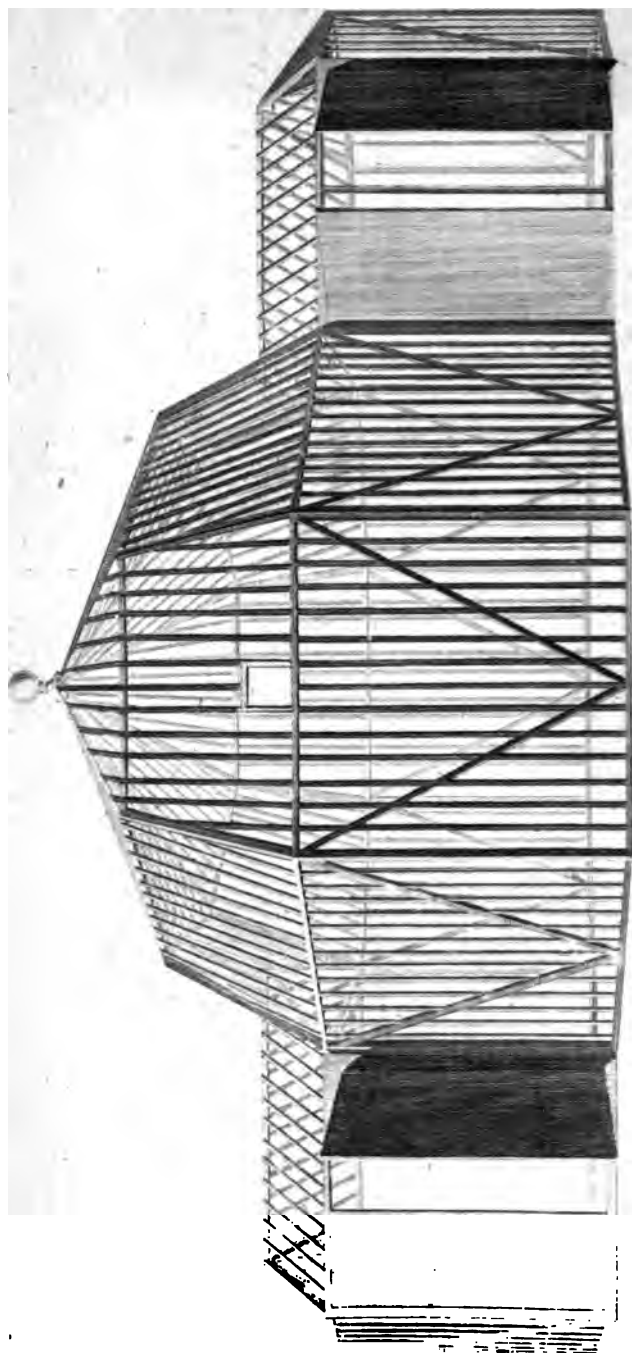
24,426 cubic feet for corn only.

445 cubic feet of timber.

702 cubic feet of timber.

By which calculation it appears, that a barn built on the present model gains, on one in common use of the same area, 6474 cubic feet of space, and is built with 257 cubic feet of timber less; and as there is nothing in its construction which would increase the expence of workmanship, the difference between the expence of building a barn on this plan, and that of one in common use of the same area, will be as 445 is to 702.—It is not necessary to say any thing of the mathematical strength, and it is obvious to any one that all acquainted with the construction of the present model, and of all others the best, will answer that the present model is the best.





MODEL OF A BARN.

[By Dr. GRIEVE; Nov. 1785:]

On my road from Petersburg to Riga, I saw at Cuicatz a number of peasants tilling the ground with their small single-horse ploughs. These instruments of tillage, which would excite the derision of an English farmer, are used all over Russia. They are very simple, and consist only of two poles or shafts, to which the horse is harnessed, and which extend backward, behind him, between three and four feet. To this end is fixed a cross bar, by which the peasant holds and directs it. About six inches forward from his hold, there runs down, in an oblique direction to the earth, a stronger piece of wood, which is divided into two points at the lower end; these two points form two socks, and are shod with iron. They are two inches distant from each other, and gently curved towards the horse. From a rope joining the two upper shafts, runs down a small stick shod with iron, and so formed as to grasp one or other of the socks, being tied in such a manner that the peasant can move it from the one to the other at pleasure. This I call the *turn glebe*, as it turns the earth to the right or left according as it is placed. When fixed on the right sock, it turns to the left; and *vice versa*. Thus a whole field is often tilled without changing sides; for at the end of the furrow, the peasant has only to change the *turn glebe*, and to return in the same track he came.

Mr. WINLAW's Patent Mill, for separating the Grain from the Ears of Corn, in place of Threshing.

Upon trial, there were passed through the mill one bushel of the heads of wheat in one minute, with very moderate labour to the man that turned it; and, by experiment, it is found that four bushels of the ears will yield one bushel of clean grain. I have tried the experiment of threshing the corn clean out from several trusses or bundles of straw, and

found that a truss, which weighed 36 lbs. contained in it 2 lbs. 4 oz. of wheat, which measured (after thoroughly cleared) two pints and a half. Thirty-six trusses are a load, and, according to this experiment, in one load are 90 pints, or five pecks and ten pints; consequently, in the thousands of loads consumed in the metropolis, there is a very great loss to the community; but the number is beyond my power to ascertain. W. W.

References to the annexed Plate.

A A A A, the Frame of the mill.—B, the outward Cone. C, the large Iron Wheel.—D, the Regulating Screw.—E, the Pinion.—F, the Hopper, to receive the Ears.—G, the Top Curb surrounding the Nutt.—H, the Fly.—Fig. 1, the Mill, 2, Combing the Sheaf, 3, the Comb for stripping the Ears, 4, the Hand Comb.

Implement for transplanting Turnips.

[By Mr. KIRKPATRICK.]

As it frequently happens in turnip fields, that large spots fail, this instrument is used for filling up those spots, from the adjoining parts of the same field. It may also be very useful in gardens, for transplanting plants of different kinds.

The method of using it is, to hold the long handle with the left hand, and the short handle with the right drawn up; put the instrument over the plant that is to be taken up, and with your foot force it into the ground; then give it a twist round, and by drawing it gently up, the earth will adhere to the roots of the plant in a solid body; then with another instrument of the same size, take the earth out where the plant is to be put, and bringing the instrument with the plant in it, put it into the hole which has been made by the other; then keep your right hand steady, and draw up

your left, and the earth and plant will be left in the hole with the roots undisturbed.

When turnips are to be transplanted in a field, there are two men employed with each an instrument, one man taking up a plant, while the other fills his instrument with earth only, thereby making room for depositing the plant; so that the hole which is made by taking up the plant, is filled with the earth taken out where the plant is to be put; which having deposited, he takes up a plant, and returns to the place he first set out from, the first man at the same time returning with earth only; so that each man is alternately the planter, and each being employed both ways, the work goes on briskly.

This instrument was invented by Mr. Cubitt Gray, of Southrepps in Norfolk, a person who has given a great deal of attention to husbandry, and particularly to the cultivation of turnips, for which crop he prepares his land in a different manner from most of his neighbours; they harrowing their land immediately after each ploughing, and then rolling it, in order (as they say) to keep in the moisture; on the contrary, he never rolls his land, nor harrows it till he is going to plough it again, but leaves it as open as possible, in order to warm it, as he thinks land can never be too warm or dry for turnips: and he has always had the best crops, even when the season has been dry when sown. This method he has followed sixteen years, and never once failed of a crop of turnips.—*Iste of Wight, Nov. 18, 1784.*

Description of a Comb-Pot, to be used with Pit-Coal.
[By J. ASHMAN, *Abbey-Milton.*]

PLATE I. Fig. 1. The furnace for water, which contains a smaller one, keeping the fuds of the second washing the wool for to be used with the next quantity of wool the first way.

Fig. 2. A tin chimney for conveying the smoke, (and carried higher in any direction made of tin) the lower part of which is made almost globular, for the better conveniency of taking away the four smaller ones from the top of the furnace, [*fig. 3, 3, 3, 3.*] to clean the same tubes continued through the furnace, close to the side at equal distances, and directly over each fire-place.

Fig. 4, 4, (with two more on the other side) the fire-place doors.

Fig. 5, 5, Cocks for drawing off the water and fuds.

Fig. 6, 6, Covers to the furnaces.

Fig. 7, 7, (with two more on the other side) Spaces between each fire-place, to receive the combs to heat on a cast-iron plate.

Fig. 8, 8, (and two more) Large wires on iron-plates, projecting a distance sufficient to prevent the wool from singeing in the combs while heating; each place heating one pair of combs.

Fig. 9, 9, An iron plate, for making the fire on, with holes to let the ashes through.

Fig. 10, A stone to receive the ashes on; and at four equal distances bricks to support the upper part.

Fig. 11, A place for the pit-coal, supporting in like manner the ashes.

Fig. 12, 12, Handles for taking off the furnace.

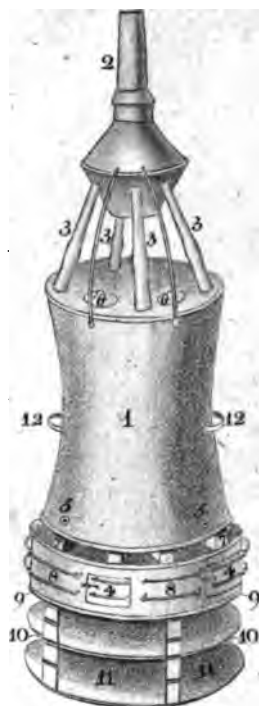
The above pot is made of a circular form, lessened in the middle for receiving the handles of the combs while heating.

Patent Drill Machine.

[*By Mr. WINTER.*]

This machine is so strong that nothing but the greatest violence can injure it; and is constructed on such plain mathematical principles, as to be worked by any person of the lowest capacity. It deposits Grain, Pulse, Turnip, Carrot, or any other seed, with the greatest accuracy, at any required depth in the earth, from the surface to six inches, at any required distance from 6, 7, 8, 9, to 40 inches between the rows, and may be instantaneously regulated so as to increase

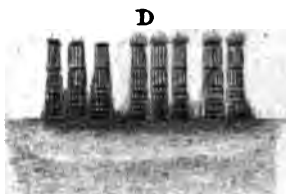
*Comb Pot for Burning
Common Coal*



The Transplanter Pl. 1



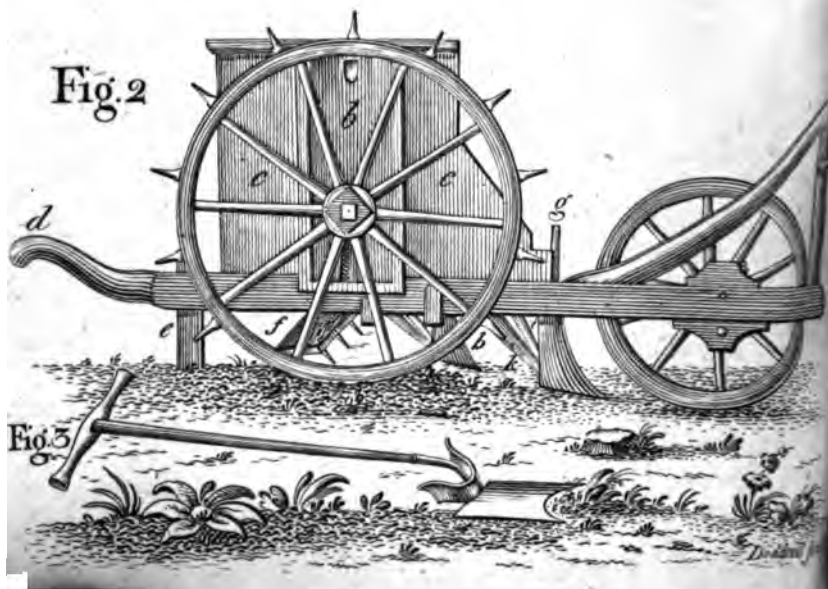
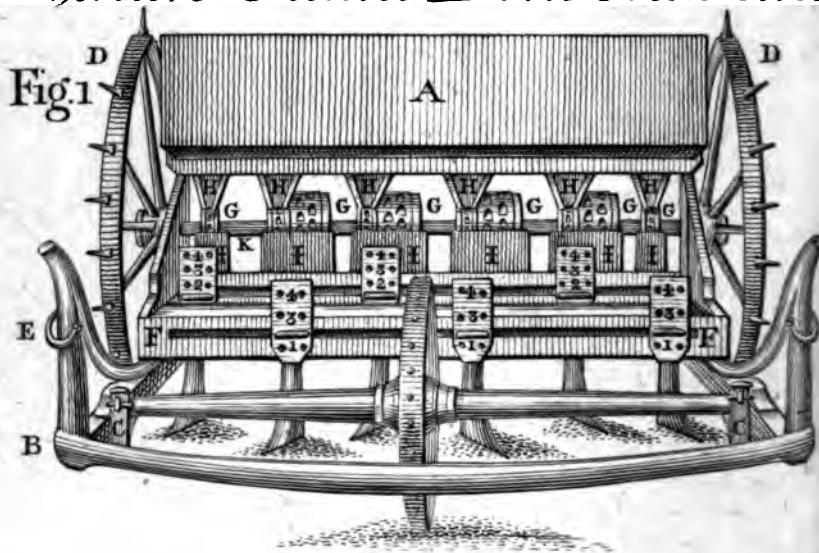
Icy Columns







Winter's Patent Drill-Machine



or decrease the quantity sown, which is immediately covered. One man, a boy, and two horses, can drill ten acres of light, and eight acres of stiff land in one day; and from one bushel of seed wheat, and one bushel and a half of barley, will produce a crop of from 6 to 20 bushels per acre, (according to the richness of the soil) more than when sowed by the common mode of husbandry.

FIGURE I.

Represents a front view of the machine when at work, with six coulters fastened on, depositing grain at the depth of two inches, in drills at seven inches distance.

A. The fore flap turned up, and the back board taken off, for the purpose only of representing the inside work, which when drilling in the field is all inclosed. It then appears as a box between two wheels, and all the inside work is perfectly secured from the effects of the most tempestuous weather.

B. The frame.

C. Iron plates, in which the gudgeons of the fore wheels are placed, and may be removed to any required depth.

D D. The two hind wheels with spikes, which are for the purpose of preventing the wheels from sliding over rough ground or clods, and by the spikes penetrating into the earth, the wheels are forced round, by which the grain is delivered; for when the wheels stop, or slide, no grain is discharged.

E E. Iron rings fastened to the fore-standards, to which the chains are fixed, for drawing the machine.

F. Coulter-bars with grooves, through which the coulters are placed at any required distance, from 6, 7, 8, 9, 10, to 36 inches or more.

1, 2, 3, 4. Six coulters numbered between the bolt-holes, with figures for setting the coulters so as to deposit the grain at any required depth; for instance, when the bolts are placed over No. 2, the grain is deposited at two inches deep; when over No. 3, at three inches deep; and so on.

G. Six cylinders, which occasionally slide off and on the axis, so that the whole, or any number of them, may be fixed at any required distance.

H. Boxes which contain the feed.

I. Conductors, into which the feed is delivered out of the cylinders, and conveyed into the grooves, in the back part of the coulter.

K. The axis, which passes thro' the cylinders and large wheels.

FIGURE II.

Represents a side view of the machine when at work.

- a.* Iron ring with a hook and chain fixed to it.
- b.* A sliding-board that covers an opening in the box, through which the axis and cylinders are taken out.
- c.* The case or box inclosing the works.
- d.* Handles for lifting up, and turning the machine at the headlands.
- e.* A marker for discovering the track of the machine, on land not ridged.
- f.* A harrow, for more effectually covering the seed and leveling the ground.
- g.* One of the three coulters on the fore coulters-bar.
- h.* One of the three coulters on the hind coulters-bar.
- i.* The guard which protects the conductors from being injured by stones, dirt, or weeds.
- k.* The pipe of the conductor, which enters into the cavity in the back part of the coulters.

There are two strong iron wheels which are placed in the back part of the frame, letter *e*, for the purpose of travelling from one place to another; which wheels elevate the coulters about six inches above the surface of the ground, and are immediately removed when set to work. There are also regulators for increasing and decreasing the quantity of grain to be sown, which with the wheels cannot be discovered in either of the views.

FIGURE III.*

Represents a running hoe for cutting the weeds between the drills, and adding earth to the rows of vegetables; the two points collect the weeds, which are in a manner inclosed, and more effectually destroyed than when the blade is square, or angular.

Description of a new Harrow and Drag.

[By Mr. TREFFREY.]

At the time of sowing barley last season, I considered that our common harrows did not answer the end designed so well as could be wished. The faults I espied in all those I had seen were, the tines or spikes were placed too near together in the middle of the harrows, which prevented them from sinking down into the ploughed land so deep as necessary; and when the ground on the top became fine, that they were apt to draw the couch, &c. together in heaps, and at the same time little or no service was done for a foot or more within each side corner; in consequence whereof we were obliged to double over that ground again, by which means I thought we lost at least one day's work in a week, which is no trifling matter.

After reflecting a little further on these things, I applied pencil to paper, and produced a plan, from which I had a harrow constructed, which in several respects far exceeded my expectations; the sides, or ends, do not only operate as well as the middle, so as not to need doubling over again, but the tines or spikes sink down so much deeper than the common harrows (on account of their being regularly placed at 15 inches distance in each bar, whereby also the clods, &c.

* Is not the invention of, but altered by Mr. Winter.

have a free passage, and are not drawn together in heaps) but that no part is left untouched more than three inches, when the harrow is drawn only once over the land; from all which conveniences, it equally excels as a drag, or first harrow, for rough land commonly ploughed; and also for such as is turned one half on the other, which we call skirting or thwarting, as well as for finishing and smoothing the surface. I imagined at first more strength would be required to draw it, but find two of our little country horses, from 14 to 14½ hands high, draw it with ease.

My harrow is 7 feet 1 inch long, and the posts 12 inches from center to center. The bolts should be forelocked ~~on~~ *top*, and have a small *flat head under*. The posts are 3 by 2½ inches, the ledges or bars are 3 inches by 3-qrs. of an inch, which was intended for a finishing or last harrow, *not a drag*.

DRAG.—The hinder post or rail is twice as heavy as either of the others, to keep down that part as deep as is necessary, which otherwise would not be the case. My ~~land~~ *land* is in general tolerably free, so that four large, or six common oxen draw it well; but I prefer four of our little horses to either.—*Beer-Barton, Devon, July 1787.*

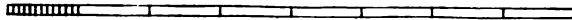
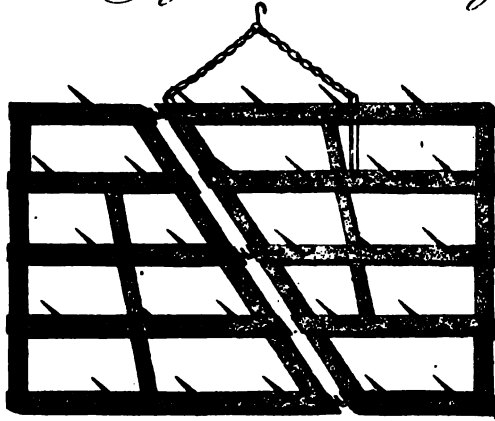
Reflections on Drill Machines.

[By Mr. WIMPY.]

Were I the inventor of any machine or implement in husbandry, which I had reason to think would be acceptable to the publick, I would set it at a price so moderate as could be no impediment to the sale of it. It may be a question, what would in this case be a moderate profit? The profits in trade, when the returns are not very large, we may suppose to run from 10 to 15 per cent. But in this case, where ingenuity is as necessary as diligence, we will suppose

M^r Triffry's Harrow & Drag

Pl. 2



A Scale of Feet



twice that sum, or say from 20 to 30 per cent. would not be generally thought immoderate. The excellence of all inventions is measured by the quantity of good they afford the publick. Every instrument or machine, therefore, be it ever so ingeniously constructed, and competent to its intended use, becomes almost useless, and of very little value to the publick, if the price be so high as almost totally to obstruct and prevent the sale of it.

Immoderate taxes are ever unfriendly to trade, and heavy charges and exorbitant expences are not less so to science and the arts. Ingenuity, even mere pretensions to ingenuity, are often taxed as high as any article of commerce. Subscriptions for thousands and tens of thousands are proposed and tendered to the publick, with as much ease, unconcern, and firmness of features now, as the most hardy veteran would have dared to have offered formerly for fives and for fifties. But this is an age in which credulity is become epidemical, and the alchemy and empiricism of Ben Johnson's days are fast gaining ground under another denomination, and in a different form. Should the drill husbandry be generally extended, as there seems to be good reason to expect, I will venture to say, new inventions of machines for drilling will most probably soon appear, of a very simple construction, and at a price so moderate as will rarely be an impediment to their use, even among the lowest class of farmers.

I have been for some years past a considerable speculator in this business, and have used many inventions for performing this mode of planting, hoping to find the easiest, cheapest, and most economical manner possible. However, I am not able to determine the precise manner of planting, so as to produce the most beneficial crops for any series of years in succession. I call that the most beneficial crop, which

produces the greatest nett gain upon any given quantity of and, for any given term of years.—*Feb. 1789.*

[*By Mr. ADAM.*]

When speaking of Ploughs, I have ventured to allege, that, though the most common, they have appeared to me the least perfect of all the instruments of husbandry; and that I was of opinion, they were not yet well understood, either with respect to their construction or mechanism. I have likewise observed in the same place, that the vast variety of ploughs over all Great-Britain and Ireland, was to me a convincing proof that none of them were perfectly good; for if any one of them had a decided superiority, it would have been pretty universally adopted, on similar soils.

This was the stile of language I used frequently to hold with my friend, the Rev. Mr. Cooke, the ingenious inventor of an inimitable drill-plough and horse-hoe. After many conversations of this kind, Mr. Cooke was induced to turn this subject in his mind; and sometime after shewed me a model, which I have hinted at in the above-mentioned section of my book, as promising well. Since that time Mr. Cooke has pursued his idea, and, in my opinion, with great success. In short, he got some bodies of ploughs made of cast-iron, consisting of a mould-board regularly twisted, with the land side of the plough, and a plug for fixing on the share, all in one piece. This combination of the parts, which so essentially affect the operation of the plough, prevents the possibility of their undergoing any alteration from the unskilfulness of country ploughwrights, who have only to add the common wood-work to these cast-iron bodies.

Mr. Cooke had one of them fitted up at London as a swing-plough, with a share of wrought iron, a coulter, and

the necessary wood-work. This he tried in a loamy soil, and it answered perfectly well, but this did not satisfy me; I therefore requested him to come and spend a few days with me in the country, and take along with us two of his iron casts, in order to have them fitted up, and make trial of them in some of the strongest soil in England, and in many places mixed with flints and pebbles. This he cheerfully complied with; we accordingly put our plan in execution, and for a first essay, I think I may add, that we met with most extraordinary success. I was so much pleased with my two swing-ploughs of this new form and construction, that I have ploughed with them ever since, and I will venture to say it is the best ploughing ever performed on so strong a soil.—*Shenley-Lodge, Herts, Nov. 13, 1789.*

On the Leith Cart.

[*By Dr. J. ANDERSON.*]

This cart is universally employed at Leith, for transporting goods of all kinds from the shipping to Edinburgh and that neighbourhood. It consists of a pair of shafts made of fir joined together by five bars of ash or elm, with two deals laid upon them, and a small piece of wood below the cross bars, resting upon the axle, for strengthening the bars; all which are sufficiently plain by inspecting the figure (plate I.) The whole of this is so light that a man might take it upon his shoulder, and so strong as to last several years in constant employment. The first cost is from 12 to 15s. independent of the axle and wheels.

This simple carriage is so contrived as to be yoked or unyoked with the greatest ease; for that purpose a pair of round rings are fixed by short chains to the collar of the horse, which slip over the end of the shafts with the utmost fa-

gility, and are there fixed by a pin put into a hole. Breeching, because troublesome for yoking and unyoking, is seldom employed.—*Cotfield, Sept. 10, 1789.*

On a new Washing-Machine.

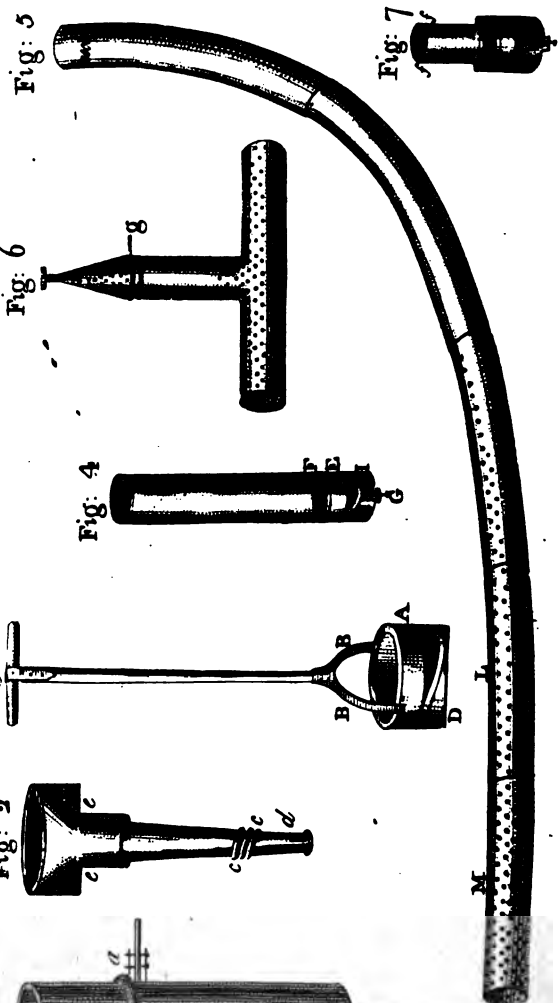
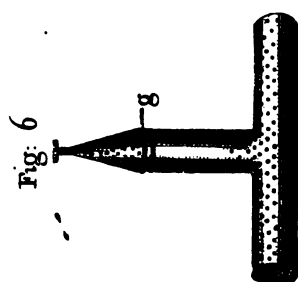
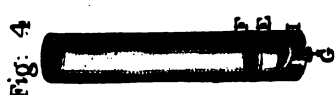
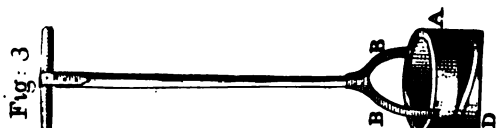
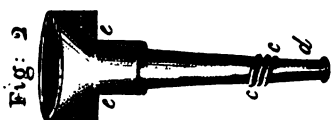
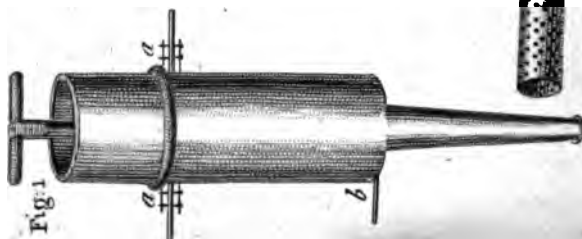
[*By Mr. HENRY MURRELL, of Bath.*]

The advantages of this machine are obvious. The saving of soap, from the more copious use of soap's lye, which cannot be used in the common way, on account of the washer's hands; nor for the same reason can so hot water be used as in the machine. The saving also of fuel, at least one-third; of labour, two-thirds; less injury also to the linen than in the common way; and, above all, the hastening one of the most troublesome parts of family economy. A stout lad or man may perform the more laborious part of the process.

On the Drill-Roller.

[*By Sir THOMAS BEEVOR.*]

The construction of this roller is so obvious, that bare inspection may suffice to shew its use. It is contrived for three horses to draw abreast, driven by a man elevated behind them. The length of the roller may be more or less, according to the choice of the owner; and the ribs of it may be also deep or shallow, so as to determine the depth of the drills, and the distances of the rows, by the same rule. The common length is about eight feet; and if eight-inch distances, for instance, should be thought most proper, then the roller would have twelve ribs. The common diameter is about twelve inches. It is almost unnecessary to remark, that the soil on which this implement can be used to greatest advan-



Hbb. 5c.

ge must be a light one, the surface even, and well pul-
rized. The seed, after the roller has passed and prepared
e drills, is to be sown broadcast. It falls into the drills, al-
ost wholly by the sowing; but that design is completed by
ush harrow, which is used across the drills to finish the
finess. After this the corn comes up in regular rows, as
ough drilled by a machine. Two horses may be deemed
fficient, on some soils. — *Dec. 1788.*

description of the Instrument called a Sward-Cutter, &c.

[*By the Hon. ROBERT SANDILANDS.*]

Figure I. No. 1, A A. &c. a square frame three feet four
ches from the fore to the hind part, by four feet three in-
es, the breadth of the machine within side; the timber
hen of fir) four inches square, placed on two wheels B B.
ree feet diameter, a little more or less, (the old fore-wheels
a chaise may answer the purpose) to support the hind
rt of the machine.

C. C. &c. six strong pieces of wood, called bulls, three
et long, five inches and a half broad, the thickness six in-
es at E, No. 2, and tapering to three inches at F. Into
ese bulls are fixed the cutting wheels, which are iron, 13
ches diameter, 3-quarters of an inch thick at the centre,
out an inch diameter, for piercing holes to fix the iron
les in; from that they are to be of such thickness, as to
low the edges to be well steed. These wheels are fixed
two bolts going through the bulls, with eyes on one end,
r the axles of the wheels to run in, and nuts and screws
the other, to make them very firm by, and sunk in the
ills to prevent their interfering with the weights L. rest-
g on them.

G. G. in No. 1, are hollow pieces of wood, called *thorles*, each three inches and a half long, which inclose the bolt M. and keep the bulls C. C. at their proper distances, but may be made longer or shorter at pleasure, as the ward requires to be cut in larger or smaller pieces. They are in two pieces, and bound together, and jointed by a strap of leather or cord, which allows them to be readily changed, when the cutting-wheels require to be kept at more or less distance.

The iron-bolt M. No. 1. goes through two pieces of wood or iron, seven inches long, clear of the wood, supported by iron stays, fixed to the frame, and through all the bulls, as at T. No. 3, it requires to be strong, as the draught of the horses terminate there.

H. H. No. 2 and 3, a cylinder or segment of wood, seven inches diameter, called a *rocking-tree*, which goes across the frame, and moves on the pivots, fixed into it, one at each end, supported by an iron-bolt, or piece of wood morticed into the frame, eight inches high, as appears in No. 2 and 3; to which six chains or ropes are fixed by hooks, at different distances, as you want your cuts, at 9, 8, 7, or 6 inches from one another, and are joined to the end of each bull, in which the cutting-wheels run; so that when the rocking-tree is turned about by the lever I. fixed in the middle of it, all the bulls, with their cutting-wheels, are raised out of the ground at once, as in No. 3, by which means the machine may be turned, or moved from one place with great ease, without any danger of straining.

N. B. The rocking-tree is not delineated in order that the plan of the frame may be more understood.

L. L. No. 1, 2, 3, are weights of free stones, six inches broad, the under one four inches high, the upper one of the same dimensions, and the weight which will weigh down to the gravity

about four stone the under, and three the upper, all of them having two holes in them, thro' which iron spikes, firmly fixed in the bulls, pass, in order to keep them steady.

When the ground is easily cut, the under stone, of four stone weight may answer; when more difficult, the other stone of three stone weight may be added, so that every wheel may have seven stone weight upon it, which has been found sufficient for the stiffest land and toughest sward the machine has ever been tried on. Cast-iron weights will answer fully better, but are more expensive, which the inventor wishes by all means to avoid.

The lever I. No. 2, 3, which ought to be five feet long, must have a sliding rope on it, fixed to the back part of the frame, so that when the cutting-wheels are all taken out of the ground three or four inches, by the rocking-tree's being turned partly round by the lever, the rope is then fixed to it, by putting a loop at the end of the rope over the pin R. No. 3, (it ought to be placed three feet four inches from the extremity of the lever I.) which keeps all the cutting-wheels out of the ground till the machine is turned, and then, by moving the loop of the pin, it slips back towards the frame, and the lever is gently led back to its place, as in No. 2, by which the cutting-wheels are put into their former posture, by the weights fixed on the bulls in which they run. The levers may be made of good tough ash.

P. No. 1, a small bolt of iron, with a hook on one end (one is sufficient) to strengthen the bolt M. to be in the centre of it, and joined to the frame by a

is a Harrow invented by Mr. San-
in a particular manner, and
of the *Chain and Screw*

Harrow. Its properties are, that if your ridges are high, and you wish to harrow them from one end to the other, by lengthening the chain (which the screw commands) the harrow, when drawn along, forms an angle downwards, and misses none of the curve of the ridge, so far as it extends, which may be nine feet, the distance from A. to B. The distance from C. to D. is five feet six inches. When the crowns of the ridges have got what is thought sufficient harrowing lengthways, you shorten the chain by the screw, which forms an angle upwards; the harrow is then drawn by the horses, one on each side of the furrow, which completely harrows it, and the sides of the ridge, if 18 feet broad.

When you want to harrow even ground or high ridges across, with the screw you can bring the harrow to be horizontal, so as to work as a solid harrow without a joint.

The teeth are formed and fixed in the common manner, square, not in the fashion of coulter, and are nine or ten inches below the wood, and of such strength as is thought the land requires. The teeth cut, or rather tear the ground at every four inches without variation, though seemingly placed irregularly, without any risk of choaking, except sometimes at the extreme angles, where the teeth are necessarily near each other, which may be cleaned with the greatest ease, by raising them a little from the ground. The figures 1, 2, &c. point out where the twelve teeth on each side the harrow are placed.

Figures III. and IV. the plan and profile of a Harrow likewise invented by Mr. Sandilands, called a *Wrack-Harrow*, from its very expeditious manner of bringing the wrack or roots of couch-grass and other weeds together. It consists of a plank of timber, six feet long, nine inches broad, and two inches thick, in which there are two rows of teeth fixed, twelve in front, and thirteen in rear, about four inches row

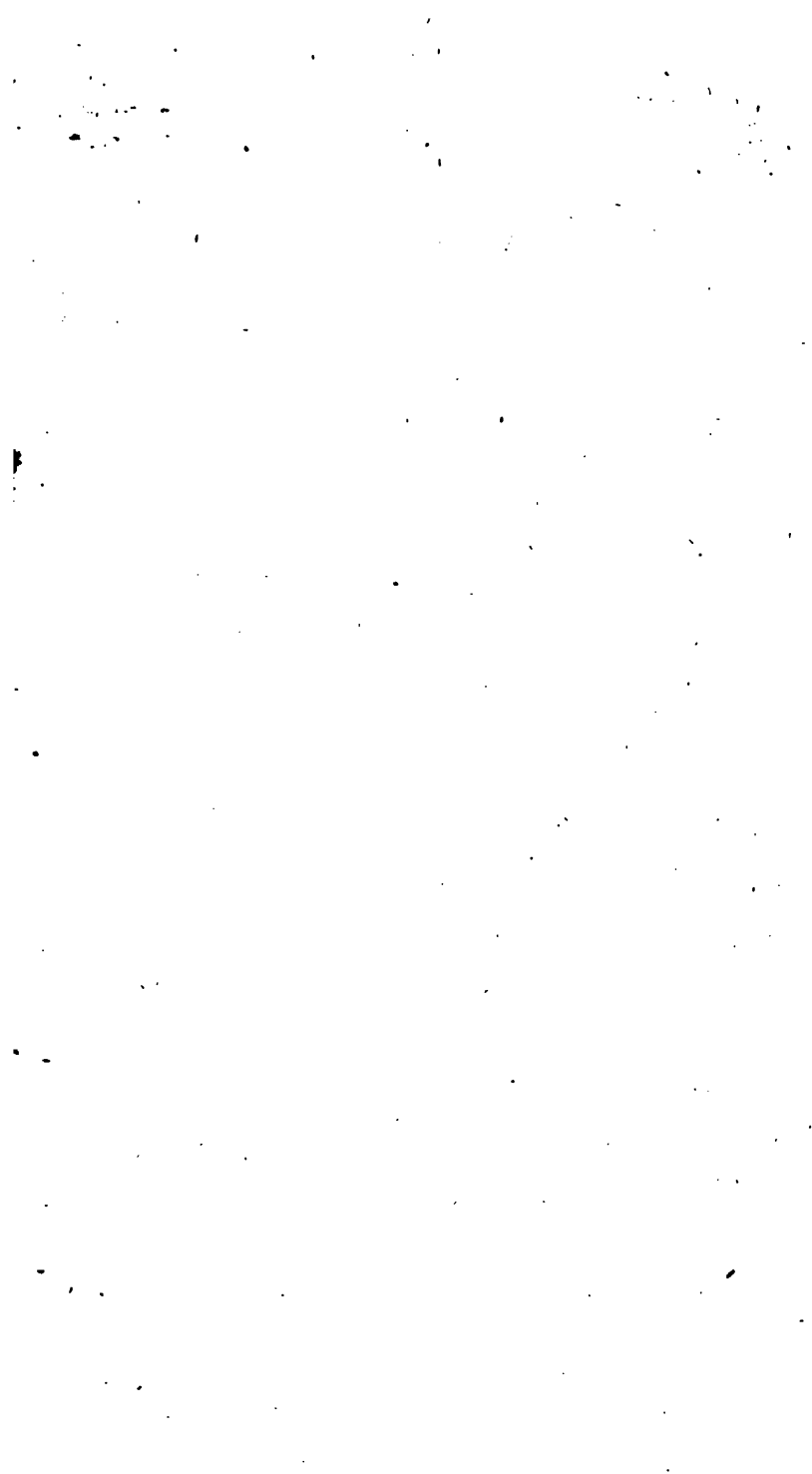
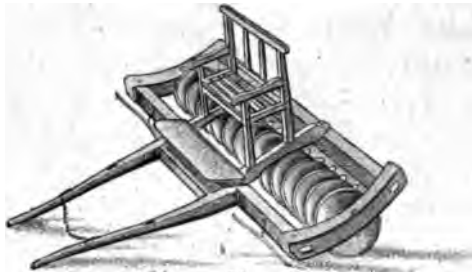
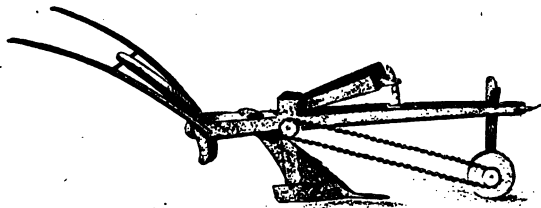


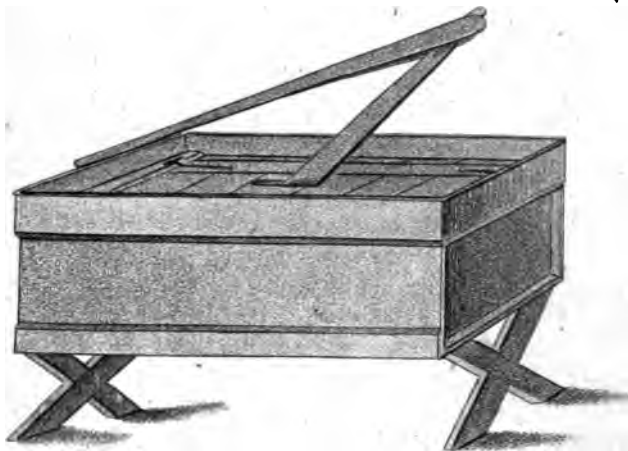
Plate. 2.



Drill Roller.



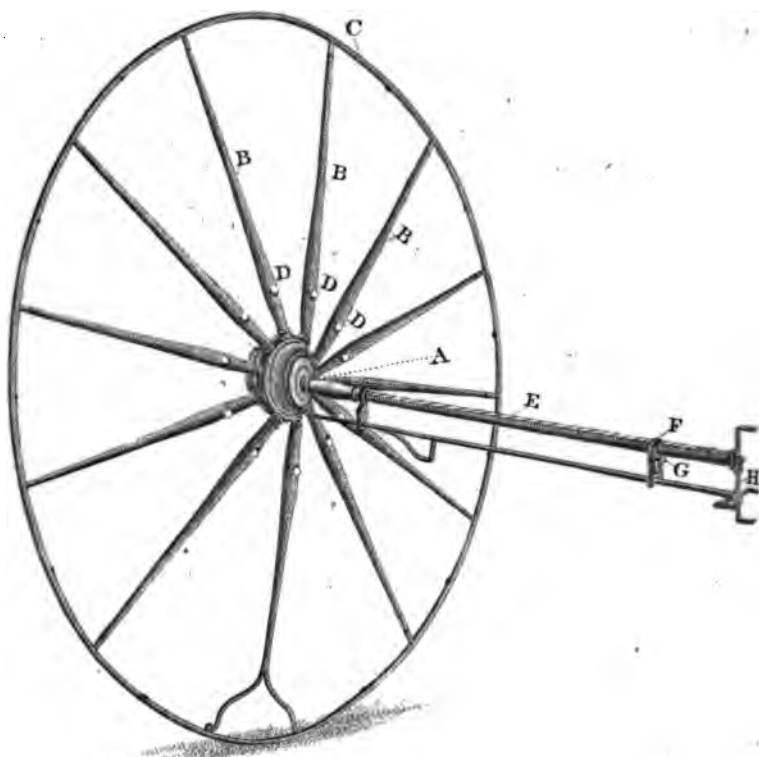
Murrell's Improved Single Drill.



Murrell's Patent Washing Machine.



AN IMPROVED PEDOMETER,



*Presented to the Bath & West of England Society,
by M^r. Lepvin Tugwell, of Beverstone.*

from row, and about five inches from each other, which, in effect, brings the teeth to operate at two inches and a half one from another. They are in length about seven inches below the wood, three quarters of an inch square, not sharp, but pointed diamond ways, so as not to penetrate the soil, but only to catch what by preceding thorough harrowing is brought above ground. To the plank is joined shafts for a horse, and handles for a man, of such length and strength as any workman think necessary.

An Improved Pedometer.

[By Mr. L. TUGWELL; Beverstone.]

References to the Plate of the Pedometer.

A. The stock of the Pedometer.

B, B, B, &c. Twelve spokes, one end of each inserted in the stock, and the other fastened with a screw to the outward ring, or periphery of the wheel.

C. Periphery; an iron ring $16\frac{1}{2}$ feet, or one pole in circumference, adapted to Gunter's concise method of arithmetick, and divided into 25 equal parts, corresponding to the links of his chain for land-measuring, &c.

D, D, D, &c. Twelve small plates, denoting the separate spokes, each including two links of the chain above-mentioned.

N. B. The twelfth spoke is divided at its foot for taking in the odd, or 25th link.

E. An iron axis, being a screw with 320 circumvolutions, separately marked on an engraved index on one of its sides. In its application, it is screwed fast into the stock of the wheel, and when at work, revolves with it.

F. A style or alidade, being an expanding screw-nut, embracing the axis, and screwing along it, as the latter revolves

C. is a valve well leathered on its top, and yielding downwards to the pressure of the air when the piston is raised up.

D. is a cross bar of iron to confine the valve, so that it may close instantly on the return of the piston downwards.

Fig. 4. Is a tin pipe or tube of less than four inches diameter, and of such length as when fixed to the base of cylinder fig. 1, shall admit the nose *d*, fig. 2, to within half an inch of the valve E. at the bottom of the wooden cylinder F. in fig. 4, which valve E. will then yield to the pressure of air condensed in its passage through the nose, and deliver it into the pipes below. This valve must be well leathered on its upper surface, and fastened with an hinge of leather to the cylinder it is meant to close; affixed to its bottom is the spindle G. passing through a spiral spring H. which being compressed on the descent of the valve will, by its elasticity, cause it to rise again, close the aperture above, and retain the air delivered beneath it. On connecting this cylinder with the upper end of the nose at *e e*, we must carefully prevent any lapse of air that way, by a bandage of oakum smeared with wax, on which to screw the cylinder like the joints of a flute, air-tight.

I. is a bar of iron, having a rising in its centre, wide enough for the spindle to play through, but at the same time sufficiently contracted to prevent the passage of the spiral spring.

Fig. 5. Is an assemblage of tin-pipes of any lengths, shaped suitably and conveniently to their situation in the ship; to the form of which, when shut into one another they must be adapted; observing only that the neck be straight for a length sufficient to admit the lower end of the cylinder fig. 4, as high as the letter F. or higher.

Fig. 6. To the middle pipe which runs along the bottom should be fixed a perpendicular one, fully perforated, to

convey the air more readily into the centre of the heap, and this may have a conical top, as represented in the plate, perforated with a smaller punch to prevent the air from escaping too hastily. In large cargoes, two or three of these perpendiculars may be necessary, and each should be well secured by an iron bar *g*, screwed down to prevent their being injured by the shifting of the cargo in stormy weather or a rolling sea. The top of the conical cap of these pipes may reach two-thirds up the cargo.

Fig. 7. Is a valve of the same construction as that represented in *fig. 4*, but inclosed in a tube of brass, having a female screw at *ff*, adapted to the male screw *cc*, on the nozzle *fig. 2*, and may then be inserted into the head of the pipe *fig. 5*. This will add to the expence, but in a large apparatus is to be preferred as a more certain security from lapse of air than the junction of the tube *fig. 4*, to the neck *cc*, in *fig. 2*.

N. B. *cc* is a neck of wood making a part of the bottom *fig. 2*, whereon to secure the tube *fig. 4*, when applied to the nozzle. The joints of the pipes when put together for use, should be made air-tight by means of bees-wax or some stronger cement, till they reach the bottom of the vessel, when there is no farther need of this precaution.

The horizontal pipes should run by the side of the keelson the whole length of the hold, the tin plates of which *K.* is made, should be punched in holes like the rose of a watering-pot, in two or three lines only at most, and then formed into a tube with the rough side outwards. *L.* may have four or five lines of the like perforations. *M.* and the rest should gradually increase in their number as they advance towards the middle of the hold, and continue fully perforated to the last pipe, which should be closed at its end to prevent the ingress of the corn. It is the centre of the

cargo which most requires ventilating, yet air should pervade the whole. Like the trade winds, it will direct its course to the part most heated, and having effected its salutary purpose there, will disperse itself to refresh the mass.

Where the hatches are close corked to prevent the influx of water, vent-holes may be bored in convenient parts of the deck, to be bunged up or opened occasionally, from whence the state of the corn may be known, from the effluvia which ascend when the ventilator is working. The power of the ventilator is determined by the square of its diameter, multiplied into the length of the stroke, and that again by the number of strokes in any given time.

Explanation of the Plate of a Patent Plough for Underdraining.

[By the Rev. M. H. BARTHOLOMEW.]

No.

- 1 Small Roller to prevent the Plough from entering into the ground.
- 2 A Rolling-Coulter to cut the turf and rushes, to be taken out in arable land.
- 3 A Flat Share, edged in front.
- 4 Bottom of the Share, round above where united to the flat; oval at the bottom, and pointed to make an opening for the water.
- 5 Pinhead, by which the share may be set to make the drain a certain number of inches from the surface, or less deep.
- 6 Plough-Beam, strong and plated.

This Plough is worked by taking off the fore wheels of a waggon, or other low wheels, with the shafts to the axle, and a chain brought from them to the hook A.—*Edgcoat, Berks, Dec. 1797.*

Fig. 1. *Plan of the Furrow Roller.*

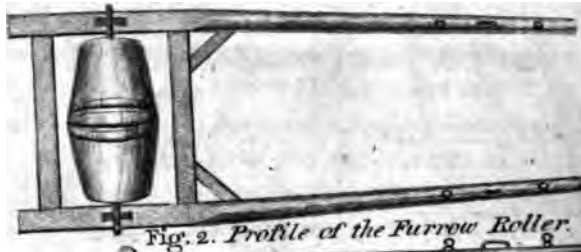


Fig. 2. *Profile of the Furrow Roller.*

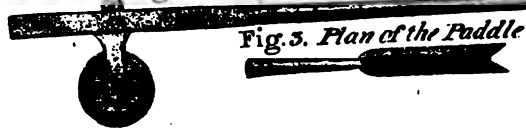


Fig. 3. *Plan of the Paddle*

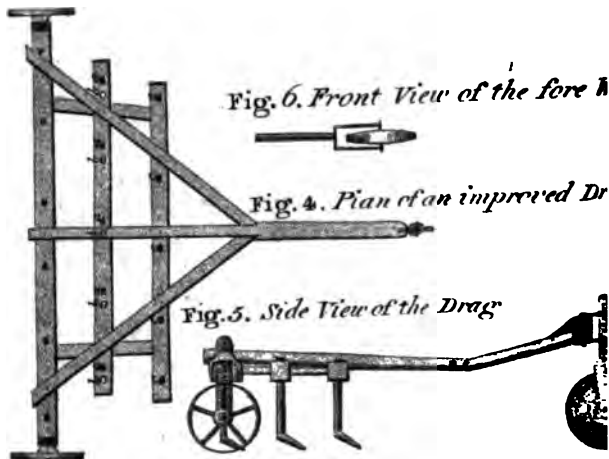
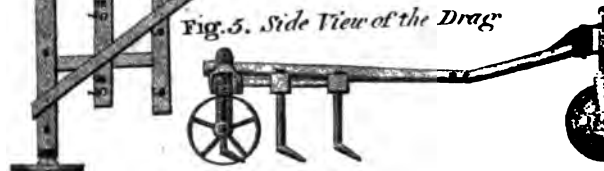


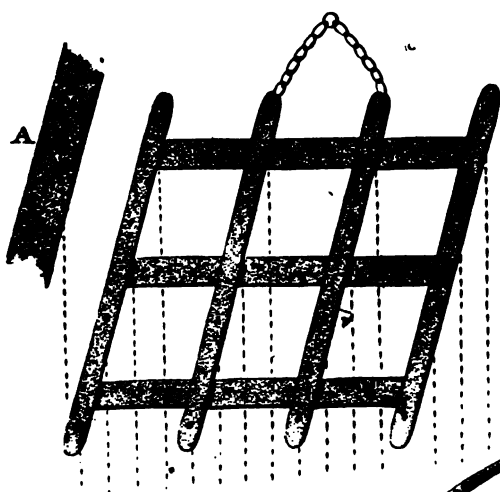
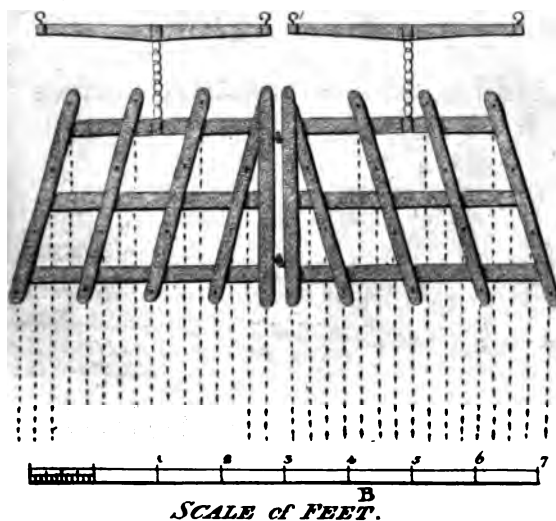
Fig. 6. *Front View of the fore*

Fig. 4. *Plan of an improved Drag*

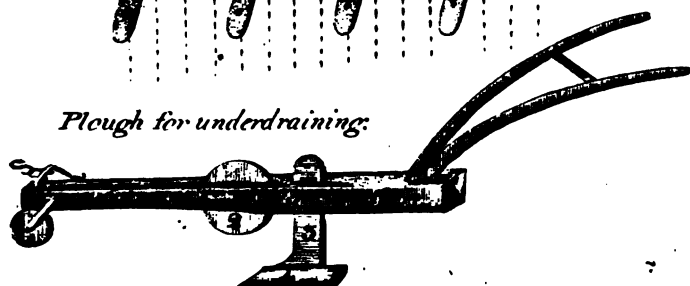
Fig. 5. *Side View of the Drag*



M^r WYNNE'S Harrows and Drag;



Plough for underdraining:





Description of a pair of Harrows, and a Drag.

[By Mr. WYNN.]

Inclosed I send you a plan of a Harrow, of my invention, which seems to me to possess some advantages over any I have yet seen. If you think it better than those in common use, you will, I dare say, give it a place in your useful publication. I also send a plan of a Drag, or heavy harrow, which I think simpler and better, without a joint. It will work a piece of ground six feet three inches broad, leaving intervals of five inches between the tracks. This is constructed on the same principle as the other, for the principle is a general and simple one, and is applicable to harrows of any size, or for any purpose; as the intervals between the tracks may be varied at pleasure, still preserving their regularity. I have sometimes made the spikes in the form of the coulter of a plough; but I find that it answers as well, and is simpler and cheaper, to make them of square iron, pointed and bent forward diagonally; and care must be taken to fix them in the posts in such a manner, as that the line of the track may pass through the angles of the spike, as at A in the plan. I have tried different ways of applying the draft, but have found none answer so well as those represented in the drawings annexed; and I recommend, that in the chain of the heavy harrow the three centre links at B may be made round, in order that the draft-chain may be fixed to which ever of them may, on trial, be found to answer best. Having found much advantage from the use of this harrow, (which is more effectual in its work than those in common use, from the manner in which the spikes are arranged, and is cheaper from there being fewer of them) I wish to give others an opportunity of trying it.

Account of a Furrow-Roller, and a new Drag.

[By Mr. W. W. PINCHARD.]

It is become a custom in the light and hilly lands in Wilts, Hants, and Dorset, to plough the furrows so that the horses may go as level as possible, in which case, as I observed before, it cannot conveniently be crossed by the common roller; as a remedy for that inconvenience, I thought a short one, to be drawn in the furrow, would answer well in both the above cases.

I have likewise sent a model and plan of a Drag upon a new construction, which will stir the land to any depth required; and by being drawn over it only once, does more good than drawing the heavy drag of this country three times, with the same strength of horses; and if, from the lands being very heavy, &c. it be required to have the tines or coulter cut at seven inches and a half, (instead of five inches from each other, as it does when all the tines are in their proper places) you are to put the tines *a a a a a* into the holes at *b b b b b*, and take out those in the fore beam at *c c c c c*, which will lessen the strength required to draw it before, almost one-third.—*Stockton, Wilts, Nov. 1798.*

On the use of Lime with Gunpowder, &c.[By Mr. GRIFFITH, *Caerhun, near Conway.*]

IN clearing my lands of the heaps of stones with which this country every where abounds, I found the quantity of gunpowder used in the operation to amount to a considerable sum at the end of the year; and as the price of this article has been increasing of late to an enormous amount, I had recourse to an expedient by which the expence of it has been materially diminished.

I weighed out two pounds of gunpowder, and one pound of quick lime well dried and pulverized, which after having been thoroughly mixed with each other, I delivered to the blaster with directions to apply it in similar quantities as he would have done the powder by itself. I then selected six of the hardest granites I could find for the experiment, and the effects of the explosion were precisely the same as if powder alone had been used. It now occurred to me that this might be fallacious, and that a smaller proportion of gunpowder would produce the same effect as a larger; I accordingly ordered the man to bore holes in a similar number of stones of the same texture and size with the former, and to put in a lesser quantity of powder by one-third than he would have done if it had been left to his own management. The stones were separated by the shock, but the difference in the effect was manifest to every person in the field; those with the mixture of lime and powder having been much more effectually broken and shattered than the others. After the success of this experiment, I have constantly adhered to the practice, and am so satisfied of its utility, that I wish to see it more generally adopted.—1796.

Method of Preparing Canvas.

[By Mr. LANSDOWNE, *Mells.*]

TAKE one quart of boiled linseed oil, and a quarter of a pound of the gum elastick—boil them gently together—they will so boil near two hours before the gum will be dissolved. Then add three quarts more of boiled oil, one pound of resin, one pound of bees-wax, and one pound of litharge of lead—boil all up together, and with a brush lay it warm, and evenly, as a coat, on the canvas.

This prepared substance will be as flexible as can be wished, without cracking—will resist wet or damp, and will be found durable, if common prudence be exercised in the care of it.—1795.

Method of making Ponds, &c.

[ANONYMOUS.]

MARK out a circular piece of ground, whose diameter is twenty yards, (more or less) and dig out one foot of earth, so as to leave the sides perpendicular that depth. Then begin to form it in the shape of a wooden milk-bowl, till the perpendicular depth in the centre be four feet and a half or five feet. On the bottom and sides spread lime, finely powdered, two or three inches thick. On this lime lay well-tempered clay, six or seven inches thick. This clay, when layed on, must be well worked with circular beaters of a foot diameter and three inches thick, first using the outside edge of the beater, which will indent the clay, then use the flat side, so as to leave it with a smooth surface. Upon the clay thus prepared, lay gravel or chalk-stone six inches thick. The gravel should have both the finer and coarser parts screened from it. No more clay should be prepared for the gravel than can be laid and covered the same day, as heat or frost will be equally apt to catch it, which must be particularly guarded against, as it would occasion the pond to lose its water. After the gravel is laid in, nothing more is necessary. A piece of ground should be chosen for this purpose to which there is a descent from all sides, if it can be found in a proper situation.

Winter, or early in the spring, is the best season for making these ponds or reservoirs.

Lay each material of equal thickness from the centre to the edges of the pond.

If lime can be made fine enough without the use of water, so much the better: if not, use as little water as possible. The clay should have no more water than will serve to make it work kindly.—In this manner ponds may be made of any size, the diameter and depth being kept nearly in the same proportion as above directed.—*Jan. 1779.*

Method and great Advantage of extracting the Essence of Oak-Bark, for Tanning.

AS there are large quantities of oak-bark annually imported into this kingdom, the bulk of which renders the freight very high, and consequently makes the article very dear, besides endangering its being spoiled by getting wet, it would be of great advantage to the community if the astringent qualities of the bark could be extracted on the spot where it grows, and reduced to the consistency of a thick essence.

On considering the subject attentively, I am of opinion, that the scheme is practicable, and would answer extremely well. With respect to the process, this extract must first be made either by decoction or infusion; and then the watery particles must be evaporated, to reduce it to the consistency desired, in such a manner as not to lose any of the qualities necessary in tanning.

Suppose the operator has at his command a common family brew-house, with its necessary utensils: let him procure a ton of good oak-bark, ground as usual for the pit; and having placed a strainer to the mash tub, fill it two-thirds with the bark; heat as much water, nearly boiling,

as will sufficiently moisten it, and mash it well together.— After it has stood about two hours, draw it off clear, and put it into a cask by itself. Make a second extract with a smaller quantity of boiling water than before, so as to draw off a quantity nearly equal to the first, and put that also into the same cask with the former. These two extracts will probably contain in them as much of the virtues of the bark as the quantity of liquid will absorb.

A third extract, rather more in quantity than the other two, may be made from the same bark, and as soon as drawn off, should be returned into the copper again when empty, and applied for the first and second mash of a quantity of fresh bark, as the three extracts may be supposed to have carried off the virtues of the first. Then proceed as before till all the bark is steeped, and a strong liquid extract is drawn from it. The bark, when taken out of the copper, may be spread in the sun to dry, and serve as fuel in the succeeding operations. The next process is, to evaporate the watery particles from the extract, by a gentle heat, till it comes to the consistency of treacle. This may be done either by the air and heat of the sun, or by the *still*, or iron pan, over the fire. For this experiment, shallow vessels will be sufficient. Let the evaporating vessel be covered, during the process, with a wooden lid, through which a number of holes are bored with a gimlet, as the steam will fly off much quicker this way, than if left uncovered; and for this reason, that in the latter case, the air, pressing on the whole surface, would prevent the steam from rising so freely as it will do through a number of small apertures.

In the colder climates, such as Canada, where Dutch stoves are used five months in the year, the same fire would serve for evaporation; so that when the process, which is not difficult, becomes generally known, the country people might

collect bark in the season; and during winter, when they have little to do, extract its essence. But were it carried on in a manufactory, the heat might be so frugally applied as to occasion little expence; for the evaporating vessels might be so constructed and placed, as for the steam to empty itself into the steeping tub, and there condense itself into hot water. This would save both time and expence.

The universal use of leather, and the great scarcity of oak bark, make these considerations of great importance to the publick; and it were much to be wished, that fair trials were made, both of extracting the essence, and tanning leather with it when extracted, with an accurate register of the expence attending each process.—*Dec. 1777.*

Paint for Pales, Doors, &c.

[By W. T.]

MELT twelve ounces of resin in an iron pot or kettle; add three gallons of train oil, and three or four rolls of brimstone; and when the resin and brimstone are melted and become thin, add as much Spanish brown, or red, or yellow oaker, (or any other colour you want) first ground fine with some of the oil, as will give the whole as deep a shade as you like. Then lay it on with a brush as hot and thin as you can. Some days after the first coat is dried, give it a second. It will preserve plank for ages, and keep the weather from driving through brick-work.

Account of Glauber's Salt, &c.

[By the Rev. Mr. SWAYNE; Pucklechurch.]

AS I was one day looking round a steam-engine which has long been erected at the coal-works in this neighbourhood, I perceived the bricks and mortar surrounding the furnace to be very fully impregnated with a substance which

from its appearance I judged to be saline. From the circumstance of Dr. Watson's extracting a true Nitre from the mortar of an old barn, it immediately occurred to me, that this substance could be no other than such Nitre, particularly as it appeared in many places already crystallized. Workmen were at that time removing the furnace, which was in a state of decay, in order to substitute a new one in its place. I took home with me a small quantity of the rubbish, and examined it by the usual analysis. The quantity examined was 20 ounces. Having elutriated the mass sufficiently with hot water, filtered and evaporated the solution till a pellicle was forming on the surface, I set it by to shoot; when it had stood a sufficient time, I found plenty of the most beautiful prismatic crystals deposited. But I was not a little surprised to find that these when committed to the fire would not deflagrate; whereupon, tasting this substance, I concluded it to be not salt-petre, but that species of salt which is termed by chemists *Sal Mirabile*, or *Glauber's Salt*. The quantity of saline matter obtained from the whole solution weighed six ounces.

Dr. Fothergill, after examining the salt found it to possess the following properties:—It has a peculiar bitter taste, like that of Glauber's salt; like that too, it has hexangular prismatic crystals, easily soluble in water, fusible in the fire, and calcinable in the air. A solution of it does not alter the syrup of violets, or tincture of litmus; undergoes no precipitation from acids or alkalies; nor can it be decomposed but by the addition of phlogiston; because having the mineral alkali for its basis, the vitriolic acid (being the other ingredient in its composition) cannot be detached from it by any other means. From these circumstances, I conclude, there is no doubt of its being a native Glauber's salt.

On administering it internally, to the amount of six drams in half a pint of warm water, it operated mildly three or four times, without producing nausea, sickness, or griping. This was repeated twice in two different persons alternately, with an equal quantity of the common Glauber's salt of the shops, and was allowed by both persons to be less nauseous, and more easy and pleasant in its operation.

On the Application of Chemistry to Agriculture and Rural Economy.

[By Dr. FOTHERGILL.]

IT is not to be expected that every husbandman should be a profound chymist; but I will venture to say, that every gentleman who wishes to improve his estate, and to advance the art of agriculture, ought to be well versed, at least, in the principles of philosophical chemistry; without which he can neither conduct experiments properly, nor explain the several phenomena satisfactorily which result from them.

To chemistry it appertains to suggest suitable means for preserving grain from smut, blights, or mildew; also for destroying, or driving away insects, reptiles, and other noxious vermin, which are wont to prey on fruits, seeds, or vegetables. When the products of agriculture are at length obtained, the aid of chemistry is still essentially necessary towards their preservation, and the means of fitting them for the various purposes to which they are destined. Grain, and farinaceous vegetables, are convertible into flour, bread, starch, malt, &c. In proportion to the saccharine matter contained in them, they become subjects of the vinous and acetous fermentation, and hence the operations of baking, brewing, the making of wine, cyder, vinegar, &c. are so many chemical processes; which, for want of the requisite

stock of knowledge, in many cases either fail altogether, or are carried on with little advantage.

The late ingenious Dr. Lewis, in his Philosophical Commerce of the Arts, suggested many useful hints towards the improvement of various arts and manufactures by chemical inquiries: and it is much to be regretted, that these have not been pursued, and extended by his successors, with a particular reference to agriculture. A course of lectures on this plan, delivered in a plain, familiar style, would be a great national acquisition, and convey the most interesting information to various ranks of men, and particularly to the country gentleman, the intelligent farmer, and curious artizan. Few there are, it is hoped, but will readily spare a small portion of the time that is generally devoted to the bottle or the chase, to partake of so useful, so elegant an amusement.

Had one fiftieth part of the treasure which has been annually expended in raising and supporting distant colonies, or even one thousandth part of what has been still more wantonly lavished away, in carrying on the late ill-fated, ruinous war, been devoted to this truly patriotic purpose, the advantages would have soon been very apparent, and would most amply have repaid the expence.—*Bath, Oct. 19, 1785.*

Experiment on WOOL.

[By Mr. JOYCE.]

A GREEABLY to the request of the meeting in November last, I have the pleasure to send you, for the inspection of the gentlemen at the Annual Meeting, the cloth I made from the wool I received from you, of the mixture of a Spanish Ram and South-Down Ewe.

As this wool was not washed, either before or after it was shorn, there has been consequently a considerable waste

in it; but not more than what generally takes place in the Spanish wool. The waste in this latter depends entirely, as I understand, on the state of the flocks at *the time of shearing*. If they receive much wet in their passage from Estremadura to the washing-grounds, the robe of 25lbs. in grease may render from 8½lbs. to 10lbs. in white; but if they be shorn dry, and in good condition, it will yield 2 or 3lbs. more. After we receive the wool into this country, it wastes again from 3 to 4lbs. per score in scouring.

The wool you sent us to manufacture was 60lbs. in the grease. It was sorted into three parcels of different qualities. Of the first quality, when scoured, there remained 23lbs.; of the second, 14lbs.; and of the third, 2lbs.; altogether 39lbs. The waste was, consequently, somewhat more than one-third of the whole. This wool scoured exceedingly well; and when dyed blue, the best ran to 21 skains, or 6780 yards to the pound, and made 14 yards of cloth; the second ran to 18 skains, or 5770 yards per lb. and made 7 yards of cloth. The remaining piece (2lbs.) was set apart for lift; it might be worth about 6d. per lb. You will observe, that the cloth made from this wool does not prove in milling so well as that made from the best Spanish wool, by one yard in twenty. Had we received a larger quantity of the wool, we should have made more sorts of it; of course, the best sort of cloth would, in this case, have been finer, and would have proved better in milling.

We would recommend, in future, to those gentlemen who keep these kinds of sheep, to have them well washed before shearing. In that case, we should suppose that the wool would be worth from 2s. to 2s. 3d. per lb.—*Dec. 7, 1798.*

N.B. This cloth being inspected by a Committee, and appraised, the best was found to be worth 15s. 6d. per yard, and the second sort 12s.—*EDIT.*

Method of Tanning Leather without Oak-Bark.

[By Mr. WHITE; Ashburton, Nov. 1795.]

I HAVE tanned several hides and calves skins (these three years past) with oak leaves only, and have found that the leather is tanned quicker, weighs as well, and answers for wear in all respects as well, as if tanned with oak-bark, as hath been proved by several persons who are judges.— The leaves which I used were gathered when the coppice was felled, which was about the latter end of May; the expence of which did not amount to the ripping of the oak: the leaves were dried just in the same manner as hay; for if they are put together before they are properly dry, they will heat and spoil. As the oak was felled, there was no damage done in gathering the leaves, as they were thought useless. The leaves are in greater perfection for tanning about October; and I do suppose that the gathering of them from the oak at that time would not occasion any damage, as they otherwise will soon fall off. If the weather should prove wet, they may be thrown into a large room, about two or three feet deep, and turned or tumbled about once a day until dry and fit for use.

I have found by experience that 30lbs. weight of leaves are equal to 1 cwt. of good bark in tanning leather; and do suppose that half the bark that is used by tanners may be saved by using the leaves. There is no difficulty in using them, as they are used in all respects as the bark. Bark being now so very dear, the above discovery must be of some benefit to tanners. The expence of drying the bark by fire, and pounding and sifting it, is considerable; whereas that expence is saved by using the leaves. The felling of coppices so young as fourteen years growth hath, for several years past, reduced the quality and quantity of oak-bark

very much; therefore I suppose the above discovery will be of publick utility.

“ We, whose names are underwritten, being tanners and dressers of leathers, have seen pieces of leather which Mr. Wm. White says were tanned with oaken leaves only, that appear to us to be equal to any tanned with oak-bark, and we think it will be of considerable advantage to tanners throughout the kingdom; as witness our hands:

<i>William Herr</i>	<i>Edward Langman</i>	<i>John Windeatt</i>
<i>George Ley</i>	<i>Thos. Bickford</i>	<i>Richard Maye</i>
<i>Wm. Bickford</i>	<i>William Batten.</i> ”	

Account of the Origin, &c, of the Bridewell, at Wymondham.

[By Sir THOMAS BEEVOR, bart.]

I Herewith transmit you a copy of the rules, orders, and regulations, to be observed and enforced at the House of correction at Wymondham; and which are also now extended to the other houses of correction in this county. If they appear severe, let it be understood they are the severities of the *legislature*, not of the compiler. The first seven rules are inserted verbatim from the schedule to the act of the 22d of his present Majesty. The rest are either included in the body of the same act, or required by the act of the 19th, called *The Penitentiary Act*. But I will make no apology for them, nor can I with any propriety deem them too harsh, since they have met with the entire approbation of the gentlemen of this county, as well that of the judges of the assize, who have perused them.

I. That the several persons committed to the houses of correction, to be kept to hard labour, shall be employed in

suitable labour (unless prevented by ill health) every day (except Sundays, Christmas-day, and Good-Friday) not exceeding twelve hours, being allowed to rest half an hour at breakfast, an hour at dinner, and half an hour at supper.

III. Males and females to be kept apart.

IV. Their provision to be bread, and any coarse, but wholesome food, and water ; but persons under the care of the physician, surgeon, or apothecary, shall have such food and liquor as he shall direct.

V. Idleness and waste to be punished, as likewise profligacy of manners, profane swearing, and abuse.

X. That neither the governor, nor any one under him, shall sell any thing used in the house, nor have any benefit or advantage whatsoever, directly or indirectly, from the sale of any thing, under the penalty of ten pounds, and dismissal from his employment; neither shall he suffer any wine, ale, spirituous or other liquors, to be brought into the house, unless for a *medical* purpose.

XI. That clean straw to lodge upon, shall be allowed to each prisoner weekly, or oftener if necessary.

XII. That no person, without permission of a visiting justice, shall go into the lodging-rooms, or see or converse with any prisoner committed upon a charge of felony, or convicted of any theft or larceny.

XIII. That the governor may put handcuffs or fetters upon any prisoner who is refractory, or shews a disposition to break out of prison, but he shall give notice thereof to one of the visiting justices, within 48 hours after the prisoner shall be so fettered.

XIV. That every prisoner be obliged to wash his face and hands once, at least, every day, before his bread be given him.

XV. That each prisoner be allowed a clean shirt once in a week.

A Table of Diet.

	BREAKFAST.	DINNER.
<i>Sunday,</i>	A penny Loaf	Hanway's Soups of ox cheek, &c.
<i>Monday,</i>	Ditto	A penny loaf.
<i>Tuesday,</i>	Ditto	Potatoes
<i>Wednesf.</i>	Ditto	Boiled pease
<i>Thursday,</i>	Ditto	A penny loaf
<i>Friday,</i>	Ditto	Potatoes
<i>Saturday,</i>	Ditto	Boiled pease.

The new buildings of the Wymondham bridewell, added to the former old house, (which is now appropriated to the use of the governor) consist of two wings, which are attached to the old house, and joined by a building in front, containing a large room, in which is placed a mill for cutting logwood, or any other wood, for the use of dyers, and beating hemp; together with a stable, and store-rooms for lodging the materials used by the prisoners in their work. The whole of these buildings forms a quadrangle, inclosing an area or yard of about eighty feet by seventy, in which some of the prisoners are allowed occasionally to take the air.

In the two wings only (to both which there is a passage from the governor's house) are the offenders confined; and in each of them, there are on the ground floor seven separate rooms, or cells, for the *men* prisoners, of fourteen feet eight inches by seven feet four inches, with a work-room of twenty feet six inches by ten feet.

On the floor above, which is chiefly used for the women and less dangerous prisoners, are, in each wing, four separate rooms or cells, of the same dimensions with those below; with a work-room to each wing, the same as on the ground floor; together with an infirmary of ten feet six inches by fourteen feet eight inches, and a scullery, closet, and necessary to each. The cells, both above and below, are all arched,

to prevent the possibility of fire, or any probable communication of infectious disorders. They are all ten feet high; and the windows of these rooms, looking into the quadrangle, and being grated inside and outside with iron, and seven feet high from the floor of the rooms, afford the prisoners no possibility of looking out, or having the least intercourse with any other person. The cells are airy, having only wooden shutters to the windows; and by a slip or wicket in the doors, a thorough air is admitted, whereby they are always free from any ill scent. This is however with an exception to *one* cell on the upper floor in each wing, and to the infirmaries; for the windows of these are glazed, and have casements to open occasionally; being mostly kept for the use of women having infant children with them, and for the weak and convalescent prisoners.

The manufactory established here at present is, that of cutting logwood for the dyers at Norwich, and beating, heckling, and spinning hemp.

N. B. In another letter, Sir Thomas Beevor has added the following remarks:

In proof of the cleanliness and healthiness of this prison, no person who entered it in health has hitherto fallen sick in it. I have never had any complaint against any one for immorality or prophaneness. The effect of the solitariness, and mechanical regularity of the place, is such, as to render them so contrite and subdued, that it not only promises fair for a lasting reformation in these poor unfortunate wretches, but what is still a better and more pleasing consideration, that it may prove a preventative of crimes in others. For, from an examination of the commitments to this house before and since the present regulation took place, it appears, that one-third fewer have been confined in it since the latter period; and it is somewhat remarkable, that except in one instance, no prisoner has been a second time committed to it.

Dorset County Gaol.[By W. M. PITT, *esq.*]

In this building are united the County Gaol, Penitentiary House, and House of Correction. It stands on an eminence, on the north side of the town of Dorchester, on a piece of ground still called the Castle, and which was formerly the site of a building of that description, at the foot of which flows the river Froome.

The buildings consist of the lodge, of the keeper's house, with the chapel, debtors' day-rooms, female fines and female debtors' rooms, visiting-rooms for male debtors, fines and felons, infirmaries, &c.; and of four wings detached from, but communicating with, the centre building on each story by means of cast-iron bridges from the several galleries. There are separate sleeping cells for eighty-eight prisoners, which are distributed in the several buildings, as may be seen by a reference to the annexed plans; and two airy dormitories for male debtors, each containing four beds, to be used in case the number exceeds that which can be accommodated in the debtors' wing; besides four cells for condemned prisoners, light and airy; four over these perfectly dark, yet airy, for the refractory; and six reception cells; which last are fitted up in the lodge. The distribution is such, that not only the male prisoners are separated from the female, and the felons from the debtors, fines, &c.; but those of each description are subdivided into classes; and for each class, by means of distinct stair-cases, separate subdivisions of the prison are appropriated with courts, work-rooms, &c. to each. The subdivisions allotted to every class appear on the plan, except those to female debtors and female fines, who have each a commodious room, with every possible conve-

nience, over the male debtors' dormitories, and under the two infirmaries, separate and detached from every part of the building, except the keeper's house and court, to which they have access through the chapel. These subdivisions are for the accommodation of the following classes:

Male debtors.

Male felons.

Male convicts, Classes I. and II.

Ditto, Class III.

Male fines.

Male bridewell prisoners.

Female debtors.

Female felons and bridewell prisoners for trial.

Female convicts, and bridewell prisoners convict.

Female fines.

Reception cells.

Condemned cells; or for king's evidence, when not used for the condemned.

Refractory cells.

Infirmary for males.

Infirmary for females.

In the reception cells in the lodge prisoners are placed immediately on their entrance, until they can be examined by the surgeon, and thoroughly cleaned, for which purpose there are a hot and a cold bath. Besides cocks and washing troughs in the different airing grounds, there is an engine which throws water to the several cisterns on the top of each building, from whence every part is plentifully supplied with water, including the several water-closets which are allotted to the use of each distinct subdivision of cells.

It should be observed, that no sleeping cells are on the ground floor; by which arrangement the custody of the prisoner is rendered more secure, and his health is not liable

to be injured by the rising of damp, and by means of air-holes constructed in the back of each cell, (except in the upper stories, where they are placed in the arches of the cells) and which are so managed as to exclude conversation, while they admit air, its thorough circulation is preserved. The infirmaries are airy, with washing troughs and water-closets, and a communication to a separate flat, on the different sides of the roof, one for each sex, for the benefit of convalescents; there is a dispensary between the two, for the convenience of the surgeon; and a pew from each, opening into the chapel, for the use of such sick prisoners as may be able to attend divine service.

There is a fund, placed in the hands of the chaplain, but under the direction of the visiting justices, and arising from the charitable contributions of individuals, from which an additional quantity of coals is purchased in extreme hard weather for the different classes of prisoners; the debts of such debtors as upon enquiry are found to be truly objects of compassion, are compounded and liquidated; and rewards are given to prisoners, who, twelve months after their discharges, produce certificates, properly attested, of their having served those who have employed them, faithfully, honestly, soberly, and industriously.

Queries proposed to the Society by an Economical Committee of Parliamentary Gentlemen in London, during the high prices of Corn, &c. in 1795, & answered,

By Mr. MATTHEWS.

1. **W**HAT mode of supplying the necessities of the poor, during the present scarcity, has been pursued in your part of the country?

2. What is now the actual rate of common labourers' wages in your part of the country? -

3. What is the ordinary proportion of common manufacturers' wages to those of common labourers in your part of the country, and how far has the former affected the latter?

4. Has there been any, and what, rise in the wages of labour, both summer and winter, for the 20 or 30 years preceeding 1794-5; and if any, at what periods, and in what degrees, has it taken place?

5. Have you known, in fact, unequal prices of labour in places near to each other, which may be supposed to have resulted from the operation of the poor laws?

6. What rise in the price of the necessaries and principal conveniences of life has taken place during the same period, distinguishing each article as particularly as may be?

7. Is task-work common in your part of the country, and how much can a man earn per day or week in this way?

8. What appears to you to have been the effect, in point of population, of increasing the size of farms, and inclosing commons; and has the quantity of land in tillage been thereby so much diminished, as that notwithstanding the improvement of what has continued in tillage, the quantity of grain produced has been less than before?

9. Has the practice of ingrossing small farms prevailed within your knowledge, and if so, with what effects has it been attended?

10. What were the habits of living among the labouring class 20 or 30 years ago, and what are they now; do they now live harder than they did then, or than they did at some intervening period?

11. Did the poor, 20 or 30 years ago, use meat and beer, more or much more than they did till the commencement of the present scarcity?

12. Do potatoes constitute, about you, a material part of the food of the labouring class?

13. Do the poor in general appear tolerably contented in their situation, or otherwise?

14. What proportions and descriptions of the labouring class, when not disabled by age, or situation, or sickness, receive parish relief, how often, and how long?

15. Have the poor-rates been progressively increasing for some years past; and if so, in what sums, and in what proportions?

16. Does any, and what, proportion of the labouring poor about you belong to Friendly Societies or Box-Clubs; and what appear to you to have been the effects of such institutions?

17. Were the common labourers' wages sufficient to maintain a man, his wife, and 4 or 5 children, without parish relief, before the commencement of the present scarcity?

18. Have the ale-houses increased in your part of the country within the last 30 years, and in what degree, and what have been the effects of such increase?

19. Do the morals of the lower orders appear to have improved, or to have grown worse, within the last 20 or 30 years; and are they more or less frequent in their attendance to publick worship?

20. What proportion of the children of the poor may be supposed to have no schooling, or whether they have more or less of it than formerly?

21. Would it be politic to hold out additional encouragement to the growth of wheat, and if so, what encouragement?

22. Would it not be politic to encourage the use of oxen in agricultural draught, and in place of that of horses?

23. Have cottages in general less land about them than formerly, and what have been the effects on the comfort and morals of their inhabitants?

ANSWERS.

1. Among farmers—selling *corn*, *flour*, or *potatoes*, or all three, to workmen, at reduced prices. Among inhabitants of towns—bread, *potatoes*, or rice, at reduced prices.

2. Various. Among *husbandmen*, from 1s. to 1s. 6d. per day.

3. Manufacturers get perhaps from 1s. 6d. to 2s. and 2s. 6d. per day. How far manufacturers' wages have affected those of labourers, or *vice-versâ*, is hard to say. The proportions are much as formerly.

4. Small advances in those periods; but perhaps on the average about one-sixth, and those mostly within the last twenty years.

5. The *variations* in the prices of labour, in contiguous places, are small, and must necessarily remain so; for such variations being subjects of common conversation, and knowledge, are uniformly regulated by such knowledge, &c.

6. A considerable rise, doubtless less in corn, till of late? butcher's meat, say one-third; in butter, one-third; in cheese, one-third; in malt, near one-half; in groceries, say sugar, one-third; candles and soap, one-fourth. The rise gradual, but mostly within 10 or 15 years.

7. Task-work is common, but not uniform. It is difficult to state an average advance, it being so much in proportion to agility and industry; perhaps one-fourth more earning by *task* than *day-work* may be fairly assumed; but task-work gives latitude to irregular working and improper expence.

8. Increasing the size of farms has not been supposed to decrease population so much as common notion would suggest. Something of truth, however, must be allowed in this notion. Fewer labourers may sometimes be wanted *after*

inclosures, but not in any considerable degree, for in some places *more* are required by the improved husbandry. Inclosures, merely as such, cannot diminish the quantity of land in tillage. Most inclosures for improving lands require tillage as the foundation of improvement. And the *demands* of the markets, for the produce either of arable or pasture, will always govern, in a considerable degree, the choice of the farmer. He will not decrease his arable, and increase his pasture, but in conformity to the demand at market.— The demand of *cheese* for *foreign* markets, added to the lessened incumbrance of tithes, or pasture, seems to furnish the principal exception to the above general rule; and this, it is probable, is become, and becoming, more a considerable evil than formerly, unless we could have more land.

9. The practice of engrossing small farms has doubtless been rapidly advancing of late years; and the effects have been disadvantageous, from the increasing opulence of the occupiers; ready-made fortunes being frequently carried into large farming: and general opulence favours a disposition to keep up high prices for corn. Such farmers can often fix prices too high, after harvest, and keep them up, because not *necessitated* to a full supply of the markets; but where there is not some average deficiency of crop, this effect is not likely to be materially felt; and even in a time of scarcity, although the popular clamour may be loud, it seems questionable whether the advance of prices, somewhat beyond the proportion of that scarcity, be not rather a good than an evil, on the whole. But for such advances, to check the consumption, and call for substitutes, the stock might become exhausted, and the evil be the greater. Large farmers also decline the trouble of the smaller produce of farms, as poultry, pigs, &c. And the *fewer* their commodities, the more they can *govern* the price of them. To alter the system

and restore variety, with its good consequences, smaller farms should be *added*; to accomplish this, more ground should be brought into new cultivation; and no means of doing it can be equally efficacious with a *general inclosure bill*.

10. The habits of living, among labourers, are doubtless altered considerably in this period. The taste, the *baneful* taste of spirituous liquors, and the common introduction of tea, sugar, and butter, into cottages, has consumed too large a part of the earnings. *Enervation*, and consequent idleness, have increased; and though they live more luxuriously in some articles, they on the whole, doubtless, live "*harder*" than formerly. The system is like *half-luxury* and *half-starvation*.

11. Certainly they did. Meat, including bacon, is become too dear to be often compassed; and beer, home-brewed, such as the cottager was formerly furnished with from malt at 3s. 3s. 6d. or at most 4s. per bushel, is now, from the enormous price of barley, and the advance of duties, (consequent on the two or three last wars) quite beyond their reach. This has been the case for several years.

12. Potatoes are in general use; and but for them, it is hard to say how any family, where there are children, and where private aid is not given, could exist without parish pay.

13. More contented than could be expected: at least not turbulent. And it is hoped the awe of authority will be sufficient to preserve peace.

14. This is a question which cannot be answered, unless *returns* had been procured—but the number is certainly increasing.

15. Progressively increasing; but the proportions would require an actual and laborious survey, to be ascertained.

16. Numerous are the Friendly-Societies and Box-Clubs. The poor are fond of them: their effects uniformly good.

Such institutions should be encouraged by Government, as an object of high importance, next in magnitude to a General Inclosure Bill. Those two objects, speedily and ardently attended to, would do more towards diffusing strength and happiness in the country, and giving scope for national recovery, than all other possible schemes of policy. And their adoption is the more desirable, because obvious in their nature, and easy of accomplishment.

17. Not comfortably.

18. Ale-houses have been generally lessened in number every where, within 30 years—more remarkably so within half that period—perhaps in the proportion of one-third or one-fourth—in some places, half have been suppressed. Effects of course favourable; but for such diminution, and the increase of potatoes, matters must have been abundantly worse.

19. On the whole, there seems to have been an improvement of morals, consequent on an increase of religious instruction, by dissenting and methodist ministers. And though profligacy abounds in many, a conspicuous reformation, and an increasing resort to places of public worship, are encouraging features of these times.

20. The general introduction of Sunday-Schools has evidently and usefully increased the number and proportion of *instructed* children in these parts; perhaps twice as many are taught to read as received such instruction 10 or 15 years back. In some places the proportion is much greater.

21. The demand at market, as has been observed before, will always furnish sufficient encouragement; give but the proper quantity of ground for tillage, by an *inclosure bill*, and you have the best possible chance for plenty of wheat, without *bounties*; which, if they operated all, or considerably, must, in the present state of things, render scarce in proportion some other articles of field produce, when certainly

there are none too abundant. The present high price of wheat has doubtless produced a sowing, for the next season, greater than usual: but should Government think any step for further *immediate* increase prudent, perhaps the most advisable step would be to offer premiums to those who should *dibble* or *set* with wheat, a certain proportion of their land in the approaching spring—not using more seed than five pecks per acre—but by no means to encourage a further additional *broad-cast sowing*.

22. No doubts can be made of the good policy of using oxen, for the general purposes of husbandry; but this has been often said, and assented to, without much increase of the practice. The improvement should be warmly recommended, and stipulated for by landlords, who would do well uniformly to set the example; but the change can neither be compulsory nor sudden.

23. The use of land by cottagers has been abridged in some degree by inclosure of commons—but certainly not to *national* injury. Other causes of abridgment, it is supposed, are *not* considerable—wherever land is lessened for the *garden* cultivation of cottagers, it is ill policy; and the effect on health and morals must be detrimental. An extension of such cultivation may be looked to as a capital source of improvement among the poor of this country—and consequently of national strength.

*An Account of the progressive Improvement in
of different kinds, kept togel.*

By the MARQUIS of B.

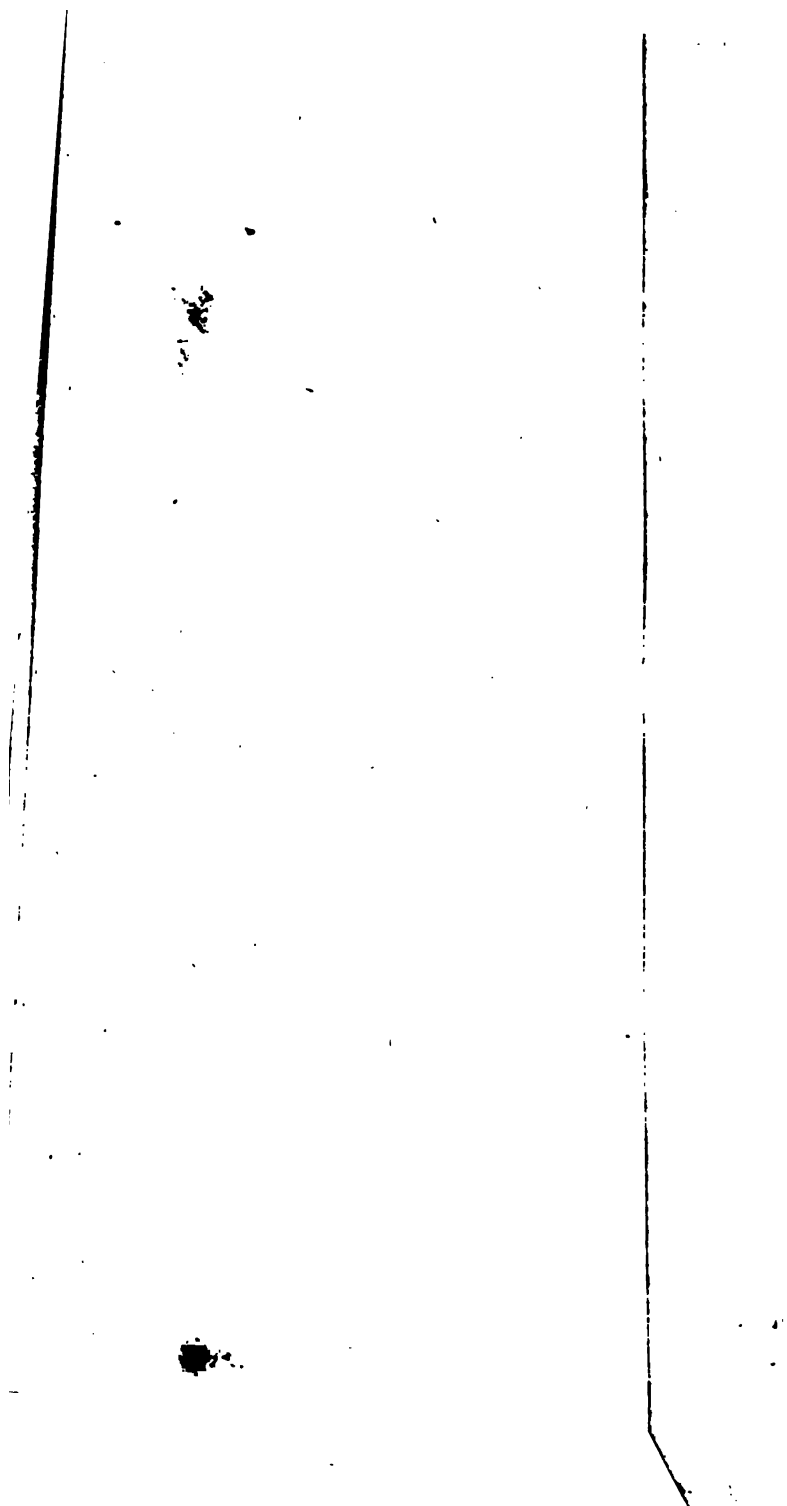
In Order to ascertain their respective Merits for Wilts,

Sorts of Sheep, ALL BEING LAMBS of 1791, And put to Flock in July 1792.	Average Weight July 1792, when put to Flock.	Average Value July 1792, after being shorn.			THREE YE 1793, 179.	
					WEIGHT.	
	lbs.	s.	d.	lbs.	oz.	
LEICESTER.	105	19	8 $\frac{1}{4}$	14	11	
COTSWOLD.	95	17	9 $\frac{3}{4}$	15	12	
DORSETSHIRE.	119	22	3 $\frac{3}{4}$	10	c	
WILTSHIRE.	98 $\frac{3}{4}$	18	6	8	c	
MENDIP.	95 $\frac{3}{4}$	17	11 $\frac{1}{4}$	10	c	
SOUTH-DOWN.	82 $\frac{1}{2}$	15	5 $\frac{1}{2}$	7	1	

In this Experiment, Regard must be had not only to the
rative Quantity of Food consumed by each. It being a w
(or *folding*) State, their Food is nearly in proportion to the
equal to ten Dorsets, but the Food that maintained ten D

The Object of this Experiment was, to determine wha

The above Sheep were kept on a Tract of very poor h
every Night, (chiefly on Arable Land) from one to two Mi
Kinds of Sheep are the *hardiest*. The small Increase in V
folded, seems to shew that long-woolled Sheep are not fit fi
Wilts, and Mendip) have increased in Value nearly an in
the Animal has made them less hardy. This experiment
to the *Grazier*, as to the *Farmer*.



*Observations on the various Topics which have engaged
the Attention of the Bath Agricultural Society.*

[By Mr. MATTHEWS.]

IT may be pleasing to some of the readers of these volumes who are not members, and to members who from their distance are unable to attend the meetings and business of their more active brethren, to know what are the topics which of late have chiefly engaged their attention. They have seen, in common with numerous well-wishers to their country, the laudable endeavours used by the Board of Agriculture, to ascertain the real state of the lands of England, Scotland, and Wales; and have not been wanting to lend their assistance, by encouraging their most capable members to be aiding and assisting in that most useful undertaking. And having long had in contemplation the great advantages which they conceived must result from a more general inclosure of open, and especially of *neglected* open lands, through the kingdom, it was with peculiar satisfaction that they found the views of the Board extended to so grand an object. Actuated by such sentiments, this Society was early and earnest in a petition to Parliament, to favour the bringing in of propositions for a general inclosure bill; and although that business has not yet been matured into the passing of an act; and some speculative differences of opinion may possibly have operated, may continue to operate, and may occasion some delay; it is hoped that every member of the Legislature will give it so full a consideration as to be able to judge satisfactorily of the measure;—and it is presumed the consequence will then be, a sufficient conviction, in the majority of Parliament, to insure ultimate success!

It will not be disbelieved by the candid reader, that is there in the Society a very respectable number of Gentlemen, whose talents and practical pursuits had qualified them to form a sound opinion: and that the almost unanimous vote of the large annual meeting of 1795, in favour of the petition, was in itself a strong proof of the propriety of the step they took. Fortified by such immediate authority, it will not be deemed presumptuous in the writer of these observations, if he indulge a little of the ardour of his own mind in here discussing a subject, which he has much at heart, and about which his thoughts have been necessarily employed. It is certain that though in the late alarming dearth of provisions, and of bread-corn especially, a large majority of our countrymen seemed decided in opinion, that a general inclosure would insure the greatest improvement of waste and neglected lands; some few persons of good sense, and much philanthropy, are continuing to doubt the wisdom of the measure. I have been assailed, in common with other advocates for inclosure, with several objections; as,

1. "That a general inclosure of common and waste
 "lands, on which many poor country people have been long
 "accustomed to maintain their families, (by raising geese
 "and fowls, keeping a few cows for milk, breeding calves
 "for sale, breeding and keeping small horses, mules, and
 "asses, for various purposes, and rearing pigs for sale and
 "for their families) would entirely destroy the species of
 "maintenance, and involve multitudes of such persons in
 "new difficulties and wretchedness, almost to extirpation."
 "Some are ready warmly to contend, also, "That this
 "mode of occupying a part of the lands of the kingdom
 "was the principal remaining check we had against the
 "inconvenience of monopolizing, and increasing the size of
 "farms."

These objections are thus fully stated, because it is proper they should be fully considered.

If, indeed, it were as probable, as the contrary seems evident, that the comfort and rational happiness of the class of persons alluded to were dependant upon their so living, and so using the common and waste lands around them; still an important question would arise, *Whether the land was so occupied as to be compatible with the interests of the far greater number of poor persons, who are obliged to live otherwise?* And if the answer must be in the negative, it would follow, on the principles both of strict justice and philanthropy, that such a system should be changed. Now this is clearly the fact! for it is demonstrable by argument, and abundantly confirmed by experience, that such lands, when inclosed and improved (and great improvement is the consequence of inclosure) will yield abundantly more produce per acre in grass, and abundantly more value in corn, and other intervening crops, than they ever did, or could do, in their open and neglected state. This is a fact too evident to be denied. And if a greater quantity of food be produced, is it produced to be eaten or destroyed? To be eaten most certainly; and that chiefly for the subsistence of man, immediately or remotely: that is, partly for immediate consumption as human food; and partly for the subsistence of a greater number of cows, to produce milk, butter, and cheese; and for feeding a greater number of horned cattle, sheep, and swine, for the general consumption of the country. The greater the number raised and fed, the greater must be the number brought to market—and in proportion to such a supply at market, will be the general reduction of prices for all the different articles: just as the plenty of manufactured goods, brought to market, or brought into the general stock, will tend to keep down the

prices respectively, be the manufacture what it may. The manufactures of Manchester and other great towns may serve as a proof of this, notwithstanding the prodigious *exportation* of those commodities. This argument from fact will appear the more conclusive to our purpose, when it is considered, that the different articles of corn are positively prohibited from exportation, till the price falls to a certain standard, which is generally considered as sufficiently low. Whenever the price rises again above the standard, exportation ceases by the Act of Parliament. The language of complaint, indeed, is not uncommon, in dear times, that, notwithstanding this act, exportation *proceeds*, and the country is deprived of its food, by the baseness of individuals, and the supineness of government. This is a complaint in which the multitude is always ready to join, on supposed or no evidence; and sometimes, as lately,* against the greatest probability. It is not always certain that the wise provisions of the act can with the most rigid strictness be enforced, and the object secured, in a maritime country like this, and in a time of general scarcity, arising from the failure of crops, and the confusion of warfare; it is not in human wisdom and vigilance wholly to prevent illicit conduct. But in the matter before us, let those who would possess the best feelings of *man*, ever remember and inculcate, that when corn will pay for clandestine exportation at high prices, and at the risk of forfeiture, it is a proof that want has invaded the dwellings of some human beings, who must either be fed or perish! This thought may be extraneous, but it lies in a little room, and will not be deemed improper by the best friends of humanity. If, however, the voice of complaint has been frequently heard against clandestine ex-

* In the scarcity of 1794 and 1795.

ports, under circumstances of *smaller* produce, we have from thence also a powerful argument for adopting such a system of managing our land, as will most speedily and effectually secure a *larger*.

Were it true, that by the casual and irregular efforts of poor persons, inhabiting the borders of commons and wastes, a greater number of young cattle, sheep, and pigs, are brought into existence, than would be by regular farmers cultivating such lands in a state of inclosure, (which idea cannot be granted) there would still be these further important questions: *Can they be likely to be so good in their kinds? Have such persons equal advantages of giving their stock the necessary supply of regular food and nourishment, even in summer, for duly pushing their growth before winter; and especially in winter to preserve them from stunting, and the various maladies to which young stock, in barren and swampy situations, without fodder, without litter, and without covering, are continually exposed?*—It is obvious, that, from such want of advantages, the hopes of those poor persons are often disappointed, to their own immediate distress, and an ultimate loss to the community at large. Even in rare instances more favourable to their views, and where from local advantages and comparatively greater skill and care they happen to have been more successful in the summer season, they *must* in general bring their stock to market before or in the severity of winter; and being obliged to sell, must sell at such prices as their more opulent neighbours will give them: If at high prices, it is a proof of general dearth, to which a too-confined cultivation has doubtless contributed; if at low or middling prices, they seldom are gainers by their pursuits—for having been obliged to subsist partly on credit till the season of selling, they are rarely able to do more than pay their debts at last. The be-

ginning of the year found them poor—the end commonly leaves them so. And unless they happen to be under a stronger moral restraint, than their station and habits in life are favourable to, they are tempted to assist themselves through the winter, by poaching, purloining, and creeping again into debt: for in general they have no regular habits of labour for themselves, their wives, or their children.—Thus they too frequently degenerate from bad to worse, and set a loose and baneful example in the districts in which they live. Such persons are too often found to be horse or sheep-stealers, and nocturnal ravagers of field crops, gardens, and hen-roosts: And hence, by exciting just fears among regular farmers and village house-keepers, of having their property plundered, these persons are discouraged from raising for market those small articles of provision, which otherwise their disposition would induce them to raise, in greater abundance!

All classes, it is certain, afford some instances of superior management, and superior rectitude; otherwise society would more rapidly degenerate into wickedness and barbarism, notwithstanding the necessary controul of laws; and charity would induce us to hope that individuals may be found, in the class alluded to, to whom these strictures will not apply. But if we compare the generality of those remote and “*independent cottagers*,” so frequently pleaded for, with such as are regularly employed in country labour, or with the active labourers in trades and manufactures, we shall certainly find, on the whole, the former are greatly inferior by the comparison, in moral rectitude, and in domestic comfort. Neither does the influence of the law of God, which is extended into national character, of a serious and malignant nature!

Another objection, which several of the most respectable gentlemen have urged, in their conversations, is, that the poor are not so much favoured, or so much in question, as the rich.

2dly. " That the commonable lands, in many uninclosed parts, now bearing abundance of grain, would be thrown too much into the power of the occupiers; for that they, in order to lessen the burthen of tithes, would be induced to convert arable into pasture, because by such conversion they could make more of *such* lands; which would materially lessen the growth of corn, to the very great injury of the community; and that late experience of the high price of grain proves, that the country cannot spare any part of its arable."

On the strength or supposed strength of this objection, several gentlemen actually refused signing the petition to Parliament from this Society, for a general Inclosure Bill. Narrow and inconclusive reasoning! Let us appeal to the common sense of mankind in general, and to the recollection of the aforesaid gentlemen in particular, *Why at any time has the farmer changed his arable into permanent pasture?* " Because," say they themselves, " he can make more of it, tithes being lessened,—and the demand for the produce of pasture is supposed to be increased." For the present, we will waive the consideration of *tithes*, that we may mention them more distinctly by and by, and combat here the general reasoning, "*because he can make more of his land in pasture.*" And is not this very reason a clear proof that the country *wants* such additional pasture? Had there been *no such want*, *no such superior demand*, for that kind of produce, the land would not yield the superior profit. The demand at market proves the want, and justifies the change—and a progressive change too, till the profits become more small. And it is most certain that such a change will be continued so long as the stimulus of greater profit lasts. High price of corn has been, our argument supposes, and that the produce of pasture lands, in milk,

butter, cheese, and meat, has been high also,—has advanced to a serious and alarming height,—calling aloud for an addition to that sort of land, in order to increase the quantity of its produce. The prices of those articles now, on a comparison with those of corn, might supply the place of all argument on this subject. The prices of corn are again very considerably reduced—far more so, in proportion, than the prices of pasture produce. How has this suddenly happened?—plainly because, high as pasture produce was, the call for corn had become *more* loud and alarming, and the good sense of the farmer prompted him *immediately* to give an additional quantity of his land and labour to the increase of corn. He supposed, with reason, that such a change would, in its turn, pay him better. Much, undoubtedly, is due to the laudable exertions of government, in offering liberal bounties for the importation of corn and rice, which produced by anticipation a considerable check in the prices, and afterwards a most seasonable supply; the enterprising spirit of our merchants, quickened by the alarm in the nation, so far seconded the exertions of government, as to effect importations from countries where grain and rice were high—for indeed they were no where cheap,—and instead of gain, much partial loss must have fallen on many importers. Thus the general reasoning of farmers, and the speculation of merchants, concurred to the same end.

Whether a general scarcity in most *other* countries, (where the popular complaint of large farms, and overgrown farmers, cannot be assumed as the cause) has arisen from the waste of warfare in Europe, from unskilful farming, from the too small quantity of land in tillage, or from a combination of most of those causes, the consideration is still serious, and demands all possible attention. But let it be remembered, as a maxim most sound and

general, that scarcity of grain has not been, cannot have been, occasioned by a culpable neglect of individuals, to cultivate the growth of grain, in preference to pasture. Such could not possibly have been the fact, unless ideas of compensation, can be supposed to have become *inverted*, and that there existed a combination, or an absurdity of policy, through different countries, to realize a *lesser* emolument, in preference to a greater.

General and praise-worthy as the present taste for agricultural improvements is, among persons of property and leisure, it is but too probable that the quantity of land in cultivation through Europe, and in this country especially, is *too small*. This probable evil was, most benevolently and laudably, proposed to be obviated at home, by the provisions of a general Inclosure Bill. And by such provisions for speedy and easy inclosure, and consequently for additional cultivation, the most considerate persons are firmly of opinion, that the grand object of the common wish, a full supply of grain, is to be accomplished.

In the view of common sense, this (under Providence) seems to be a radical and sure method of accomplishing the object of the general desire. For, let it be supposed for a moment, however unreasonably, that the casual difficulties, and scarcity of this country, in the article of grain, have been occasioned by too great an appropriation of land to pasture; and that the effect of inclosing commonable lands would be, the still greater conversion to pasture of such arable districts: let it be supposed, that so large a quantity as two millions of acres would, under such an act, be even *permanently* so converted; and that such a scale of conversion to pasture would answer the ends of emolument to the persons so changing it; that emolument could arise from no other source than the aggregate choice and demand of the

publick. The *choice* of food is the natural, and even the moral, right of individuals in a community. Excess, gluttony, and waste, in the articles of subsistence, are the main evils under this topic, of which we could have a reasonable right to complain; or to which any warrantable restraining policy could be directed. But we do not make this hypothetical concession in favour of so converting two millions of acres, at any risk of lessening the arable produce of this country:—most certainly not! To *twice* the amount of this quantity of additional pasture, we are warranted in contending that the country may go; that it may be looked on in the light of a most valuable acquisition; and still only as a *part* of a much greater within our reach!—The waste and uncultivated lands in England, Scotland, and Wales, are set down in the County Surveys, which do so much credit to the Board of Agriculture, at more than *twenty millions of acres*! Let us suppose than only one half of this quantity is capable of being inclosed, and brought into new cultivation! On this hypothesis we can not only replace to arable culture the two millions of acres, which a timorous reasoner may suppose to have been misapplied; but, after giving (if wanted) another two millions to pasture, we shall have six millions in store for the operation of the plough, and to give additional labour for additional hundreds of thousands of peasantry, now supposed to be scantily employed, or who may hereafter come into existence. To this consideration may be added another, of no trivial importance, viz. That by the inclosure and cultivation of one ten millions of acres, the other ten millions will become of double, and perhaps treble the consequence, from the local uses to which they may be gradually applied.

Here let the philanthropist employ his mind, and anticipate new encouragements to the virtue and endearments of

conjugal union,—now, alas ! but too lamentably obstructed, to the gradual declension of national strength, and of morality, in the lower ranks of society ! For with all the boasted glory of British arms, and British commerce, unnumbered thousands of fellow-beings, who might flourish in our fields, seem now to be only born to the miserable alternative of unnatural solitude, or vicious and barbarous intercourse ! Here let the manufacturer and the merchant, who are emulous of the most honourable pursuits, in their respective stations, anticipate the means of employment, on the most solid and liberal foundations. Here let the owner of lands, instead of fearing (if it were morally allowable to fear) a depreciation of his property, anticipate a stable and substantial value to his fields, his mountains, and his vallies !—Here let the government of these countries, wisely desirous of cultivating peace, of augmenting security, internal strength, and national greatness, lay the only sure and permanent foundation, on which to rise from the calamity of warfare into the proper dignity of our peculiar situation.—Here let the advocates for christian morality, who take into their account the usefulness of steady, honest, and laborious industry, ground the most auspicious arguments, for the renewal of those moral bonds and virtues, which they have so long and ineffectually been heard to deplore the want of !—It is a general complaint, not only among the most serious professors of religion, but among reflecting persons of various descriptions, that amid the splendour of arts and sciences, of foreign commerce, and the luxury consequent on national wealth ; internal poverty and wretchedness, among the inferior classes, are too little alleviated, till by accident they become subjects of hospitals and infirmaries : these indeed are frequent and noble edifices—and their endowments and support do credit to the sympathy of the English people. But it has been

lamented, with some colour of reason, that a calm, deliberate, and provident benevolence of mind, is less characteristic of English feeling, than the occasional and extraordinary. This remark, if well founded, is yet far from discouraging; it admits a noble capacity and a noble disposition for extraordinary exertion; and from which we may hope for noble, generous, and comprehensive improvements.

The frequent ignorance, and dissoluteness of manners, consequent on a precarious income in country villages; and a necessary resort of multitudes of young persons to cities and towns, have been too little the objects of publick attention. The want of agricultural employments, and other comfortable inducements to a country life, will, always, without a radical improvement in our domestic policy, continue to produce and augment this national infelicity. The dirt and indigence in which numbers of our country cottagers live, forming a mortifying contrast to the allurements of towns and cities, occasion a too common discontent and disgust in young persons: hence their too frequent migration from the districts of their nativity—their enticements to depredation, prostitution, and the numerous evils of a crowded life. To remedy these evils, it is to be lamented that country gentlemen, and other considerable land-owners, are so little attentive to rural policy in the improvement of cottages, and the annexation of small pieces of land, for orchards and gardens, thereby to allure and fix the most active and useful of the peasantry. An increase of whose number, even in the present state of our agriculture, would often be found of great importance to the seasonable management of our fields—for expeditious sowing, weeding, hoeing, and getting in of all sorts of crops. To the general want of hands, for those various purposes, may be attributed much of the slovenly system which prevails in many districts, and

the delay, damage, and scarcity, which have been constantly complained of.

An increase of the number of well-instructed labourers is confessedly much wanted; and nothing can bid fairer for a general alteration in this important matter, than a new occasion for building cottages, and setting examples of neatness, and comfortable accommodation. Such new occasions must naturally arise among the effects of a general inclosure of waste and neglected lands. When we consider modern improvements, in the elegant simplicity of building, which has taken place of late years, and the emulation in useful arrangement and taste, which a general opportunity would occasion, we may venture to predict the most pleasing and happy effects from such an occurrence. The new and extensive example would naturally become a marked excellence in the country. As the occasional improvement of a few houses in an old and incommodious town leads gradually to more general neatness, (when repairs become wanted) so the old country cottages and miserable huts, in which indolence, dejection, disease, and indelicacy, have been long propagated, will gradually become improved and re-built; and the allotment of land for useful garden purposes will become increased, to the improvement of the inhabitants in the essential articles of industry, health, decency, order, and contentment! The country would thus by degrees, and perhaps not by slow ones, acquire a new face of *civilization*, respectability, and ornament.

Taking it for granted, that for reasons assigned, and from the reflections of the intelligent reader, an alteration in the general face of this country will appear desirable, and indeed necessary; I may, perhaps, be indulged in enlarging a little further on my favourite part of the scheme—a part on which too much has never been said, or can be said, till experiment

shall have superseded the use of argument: I mean *the improvement of country buildings*. These have been topics of the Society's continued notice, and indeed of its solicitude. The plans already given in for cottages and gardens—and the premiums offered for plans of small as well as large farm-houses and offices, speak this. And it is with pleasure I can remark, that in my intercourses with the publick I have found those objects generally *applauded*.

Superb and costly buildings in cities, and magnificent mansions in the country, are objects of general admiration. They are considered as the noblest external ornaments of polished life. They excite the commendation of foreigners, who often bring a bias from the mansions of monkish superstition, and the splendid distinctions of a feudal aristocracy. Elegant edifices, thickly reared, are the constant theme of exultation among ourselves; the degree of that exultation too often borders on a mischievous vanity, and excites an injurious emulation. Emulation of magnificence, for domestic uses, is generally unfavourable to morals, and (by the surest of all consequences) to human happiness. A superb and costly edifice is a cumbersome article of property in itself, and is often gradually augmented, to a size and to a style of splendour, incompatible with the general interests of the owner and his family, rendering doubly disadvantageous the principle of *primogeniture*, which (however defensible on the score of family consequence) is in itself sufficiently embarrassing to numerous families. The tax laid on posterity for the support of solitary grandeur is often found irksome; and to support, with a supposed consistency, the dignity of family possessions, leads into numerous expences, unfavourable to the present comfort and future security of the occupier. Hence the incumbrance of estates, which cannot be sold—and at a low price, where

the mansion is no longer supportable. The stately building goes to decay, and either becomes an inappropriate and dilapidated farm-house, or is totally abandoned and pulled down on account of the weight of its repairs. To build another farm-house on a suitable scale, is incompatible with the finances of the owner—and at once to get rid of the inconvenience, the land is let in connection with an adjoining farm! And hence, perhaps, more than from any other single cause, we may date the accumulating evil, so much complained of, the present disproportion of *immoderately large farms*! This occurrence, although too obvious to have escaped the notice of others, seemed also too obvious a part of our subject to be passed over without remark. And altho' it be of a nature for which a general remedy cannot be expected, if politically to be wished, yet the consideration of it; by the way, may at least have an useful tendency. An extreme reverse of this supposed evil may be equally unfavourable to the common interests of the country. The *golden mean* has been deservedly celebrated in theory, and will never be found unsalutary in practice. Among men of moderate landed possessions, where one has lived to lament his caution in the expences of unnecessary building, many have had cause to blame their profusion! And among the objects of useful ornament in an agricultural district, one of the most conspicuous and striking is a well-designed, well-proportioned, snug, and simple mansion, with suitable offices, adapted to the consequence of a substantial land-owner, or wealthy yeoman, without necessarily impressing on the mind the idea of expensive splendour and luxury.

The next in order, more useful, because required to be more frequent, and scarcely adapted to give less pleasure, is the plain, neat, convenient, and well-proportioned *farm-house*, and homestead. These are buildings which, generally

speaking, can never be out of use—can never be either an incumbrance on the land or on the country. The expence of their preservation, when well constructed, is easy; and in general the preservation of farm-houses, and offices, by the tenant, may be made one test of his worthiness to have his lease renewed.

In cases where lands are to be inclosed, new farms to be formed, and new buildings to be erected, a judicious choice of situation, with regard to that of the lands, and also respecting water, healthiness, and warmth for cattle, is a first object, and of great and lasting importance. Under this idea, smaller objects, as nearness to a stone quarry, to an old orchard, or to a few casual walls or buildings, should be made to give way—for it is often evident that farm-houses are so inconveniently placed, perhaps originally to save a first expence of 50l. as to make a farm of moderate size full 50l. per annum less valuable to a good farmer. The community in such cases always ultimately suffers. A complete previous plan and estimate of the whole are indispensable to the builder's security and satisfaction. By such prudent procedure, it is reasonably concluded, that the adaptation of the buildings to the land, may in general be so complete as almost to insure their transmission *together* from one generation to another—and that with the satisfaction that their connection is compatible with the greatest usefulness in the district, and to the community. These conveniences and benefits have often engaged the consideration and indeed the solicitude of this Society, perhaps never more opportunely than at the present period.

Under the head of buildings, *cottages* claim our attention. Few opulent country gentlemen are so surrounded by grandeur, but that within their neighbourhoods, and sometimes on their own estates, they have to pass the abodes of poverty,

rendered pitiable by incommodious and wretched buildings—the sight of which is at once disgusting to the eye, and discreditable to their owners, in proportion as they have the power of improvement. I use no stronger word than *discreditable*, because I cannot suppose that in general the defect arises so much from wilful want of kindness, or of good policy, as of habitual attention to the subject. So frequent are the instances of gentlemen suffering themselves to be drawn easily into unnecessary expences, on trivial occasions, or for trivial objects—so common their indifference to opportunities of emolument, far beyond the expence of a new cottage, that their neglect of such improvements must be attributed to other causes than *covetousness*; nor will pride and disdain account for it. It seems to have been considered as a thing of course, (so far as it has been considered at all) that poverty of circumstances, and incommodious habitation, are in necessary connection. But a little reflection may convince an ingenuous mind that, though to a certain degree poverty of circumstances be necessary in the laborious classes, and is no moral or political evil, yet decency at least is desirable in all our fellow-creatures—and that in proportion to the general decency of servants and dependents, is their general usefulness in their several stations. No reasoning man expects in an equal degree those useful qualities, and that comfort, from taking as inmates into his house, servants who have been in habits of dirty living, or who have not attained practical notions of cleanliness and decorum; as from servants of different habits and acquirements. This idea, extended to out-door labourers, will hold equally true—and in order to have them the most actively useful in their stations—to acquit themselves with judgment and dexterity—and indeed with that useful *taste*, which every field employment requires or admits, they must have acquired strong

habits of decency and of order. This gives men of every station a bias to exactness and propriety, in every part of their labour; and the more they have been so practically accustomed at home, the more habitually will they aspire to excellence abroad. Whether the business to be done be the cleansing of a stable, a pen, or a fold for cattle; of a farm-yard, a pond in the field, the making or mending of a ditch, the planting or plashing of a hedge, the grubbing up of weeds or brambles, the mending of a road, or whatever else in these common offices of the labourer; any or all of them will be done the better, by how much the labourer has been accustomed to value conveniences, and the appearances of neatness in and about his own dwelling. If he be accompanied in his labour by one or more of his own children, they will naturally emulate the taste of their father—and they will in general not fail to carry those ideas of useful exactness, alternately, from their cottage to the field, and from the field to their cottage. But if the cottage be so small, or ill-contrived, so shattered and miserable in its lights and covering, and ill-accommodated with garden ground, that it cannot be made healthful, pleasant, or profitable, they have not a reasonable motive to delight in it, or to exercise ingenuity and industry about it, in their morning and evening hours. Indeed, generally speaking, such miserable cribs have seldom any quantity of ground to exercise ingenuity and industry upon. A piece of potatoe ground is, perhaps, got at a distance:—this is inconvenient, by occasioning a waste of time—it detaches too much the eye of the father from his family—if he delights in his garden, it is in the wrong place—order and harmony at his home are the less preserved—his hut is the least object of his liking—it receives no regular share of his short attentions—he returns to it in the dark, merely as to a den, in which he may lie down—and from which he may depart again—he can open his eyes—

But give to a young man, about to settle in a life of useful country labour, the requisites for domestic fixtured and enjoyment; give him, at a reasonable rent, such as may pay the builder four per cent. for his money judiciously laid out, a cottage, simply but neatly and conveniently built, with two or three sleeping-rooms, in one of which his wife may lie in with detached decency—give him a well of water—or place him by the side of a running stream—give him at least half an acre or from that to two acres, occasionally, of adjoining ground—and give him an assurance of continuance, and of constant employ, on condition of his industry and general good conduct; and you will most likely lay the foundation of much happiness, and much respectability—fix for life a faithful and grateful servant—and add to the strength of the country by the most healthy population. A sum, perhaps not exceeding 50*l.* or 60*l.* thus laid out, at moderate interest, may do all this!—For the sum of 500*l.* or 600*l.* laid out *together*, (which to many gentlemen would be no inconvenience) or at *different* times, (which to others might be more agreeable) may be produced a little colony of labourers, living in neatness and comfort; a picture which, in the mind of a benevolent observer, would be a more lively and pleasing ornament than all the superfluous houses, and all the dog-kennels, in the universe. The annual expence of this human and humane establishment, reckoning the most strictly, would be only the difference between four per cent. for a small sum of money, and what it might be supposed to produce by other common means, out of trade! Suppose one per cent. on the average were lost: this, in figures, makes a sinking on ten cottages, of 5*l.* per annum! Suppose, in the extreme, that two per cent. can be lost; this would not amount to half the expence of one unnecessary horse—or one foot-boy in livery; But when we consider

the advantages of possessing such a set of tenants, as labourers, and the superior pleasure of beholding their happiness, the scale will abundantly turn in favour of our object.

Examples of publick spirit, and of sound benevolent policy, not only excite notice but imitation. And if one gentleman of fortune in a neighbourhood were to set, or begin such an example as this, we need not despair of seeing that example soon followed, or indeed of its becoming generally imitated. Such philanthropy and sound policy would have their most happy effects: and become the means of gradually exalting an useful country life into that simple and proper dignity which really belongs to it. It would not be laying a foundation for indolence, pride, or arrogance: those inconveniences to society are not to be expected from rendering laborious men comparatively easy and happy. Constant labour is annexed to this diffusive plan of comfort; and it is too necessarily a main part of the system, and a regulator of the whole, to admit the usurpations of ease and independence.

The benevolence of many gentlemen may induce them to accede to this general reasoning; but some will object to the risque of entailing the expence of a number of poor on their manors by settling them on their own estates. So far as this objection is founded, even in local circumstances, it must be admitted to operate as of some weight—for, however generally and fairly the scheme would promise an exemption from incumbrance, by the greatest probability that such tenants would maintain themselves, and live superior to the idea of taking parish-pay,—yet from severe sickness—the death of parents—and the smallness of orphan children, some instances of expence may possibly occur: and we must not expect, under such possibilities, that gentlemen will stifle the objection. But in numerous instances similar improve-

ments may be made within the bounds of common parishes, still on their own lands—and that sufficiently near for gentlemen to enjoy the pleasure and partake the benefit of such useful works in society. But this objection is also to be obviated in another, and in a more generous manner. On a supposition that a gentleman should choose to build ten or a dozen cottages, as aforesaid, on the borders of his own estate, the parish being wholly his own—and that in compliance with antient custom, he should be actuated by caution against the expence of paupers. He might secure himself from such contingent expences, and at the same time improve the condition of those families, by erecting them also into a club or friendly society—that best of all provisions for the casualties of life—that best of all means for exciting and continuing the ideas of œconomy, sobriety, and happiness. These ten or twelve men, by a contribution of one halfpenny per day each, out of their labour, would soon establish, under their landlord's superintendance, such a *fund* as would amply secure him against any such contingent expence, either by sickness or death; and be an additional source of rational delight, to minds capable of delighting in the happiness of the ranks below them. The trouble of this mode of provision would be the most trifling—some one of the cottagers themselves, as head and father of the colony, by his age, capacity, and superior virtue, would be pleased with the office of collecting the money, and keeping the simple account—or it might be retained, with the weekly rent, out of the weekly pay, by the persons paying them their wages. This plan may not only be considered as a rational mode of preventing cottagers from becoming burdensome to the manor or district in which they reside, but it would be setting a practical example of that mode of altering the general condition and prospects

of the poor, which are now truly alarming—and which the enormous burden and increase of the poor's rate proclaim aloud must be altered, or the growing consequences will be insupportable to the middling classes. It has been contended, with the strongest appearance of truth, by several ingenious writers,—it has been *proved* by the writings and practice of others, and particularly by that able writer and most benevolent man, Mr. P. W., of Shaftesbury,—that the plan of such contribution, aided by the friendly care and assistance of a few persons of steady discretion, in the different districts through the nation, would totally change the face of the country, and redeem the whole mass of poor from that wretchedness in which they too generally live, and to which the present system of support naturally tends !

The late dear seasons, to which we have already alluded, suggested the necessity, as most of our readers will remember, of finding temporary substitutes for wheat-flour in making bread. Under those circumstances, so much the subject of alarm through the country, it was to be expected that this Society should give its attention to such topics of oeconomy. The mixture of equal parts of good barley and wheat, of good wheat, barley, and rye, and even in some cases with a small mixture of bean-flour, it has been long known, would make a hearty nutritious bread ; such bread as would not only suffice to carry the bulk of a country, with cause of thankfulness, through a season of scarcity, but some of those mixtures might be deemed even *pleasant* for common use. To those mixtures, it is well known, a large number of persons in country places had successful and seasonable recourse. But there was one article of farming produce, which within the last twenty years has become abundant beyond what our forefathers had any expectation of, and which is now deservedly recommended as of prodigious na-

tional importance, i. e. *potatoes*: to the use of this article in bread it was to be expected much regard should be paid—and the fact was so. This Society was not wanting to promote experiments which several of its most active members were assiduous in making, to ascertain the degree of utility resulting from the best proportions of such a mixture, and the degree of advantage. It was found to be a fact, that with no inconvenient trouble, the proportion of one-third potatoes to two-thirds of wheat-flour, or one-third wheat and one-third barley-flour, (but especially the former) would make a wholesome nutritious bread. It was found also that to take mealy potatoes, fresh boiled and peeled, and break them up warm in the sponge, was an advantageous mode of using them. The result of different experiments, as to the proportional weight of bread arising from the use of potatoes, was various—perhaps depending on the different degrees of farinaceous substance, in different sorts of potatoes, and other small causes not easily ascertainable. But, on the whole, the experiments went to the general establishment of an opinion, which it is not expected will be superseded, that the most advantageous mode of using potatoes in poor families is that common one of eating them, simply boiled, either as a complete substitute for bread, or of bread and other articles of consumption often eaten together. The late severe period of trial, and the comfortable effects felt from a large cultivation of this root, have tended to confirm the heretofore supposed fact, that whatever shall be the success of popular endeavours to bring more land into cultivation, the extended culture of potatoes is an object of high importance—and that when their various uses are considered, in the immediate sustenance of human life, and for the sustaining and fattening stock, the quantity to be raised in this country cannot easily be too large. That

cultivation, therefore, by the various improved modes of carrying it on in the field, and by shoots which would otherwise be thrown away, and breaking off and transplanting the young tops as cabbage plants, where garden beds may be conveniently had for receiving them, is earnestly recommended. It cannot be either expected or desired that this culture should materially supersede that of corn,—the value and *first* consequence of which are not impaired by the various discoveries of the *secondary* value of potatoe crops; but as potatoes may be raised in large quantities, by a careful management of odd pieces of land, head-lands, the borders of fields, the banks of ditches, the soil of orchards, and for bringing forward all rough grounds, for corn culture, &c. it is the strong recommendation of this Society that those objects should be especially kept in view.

Another object, of no small concern, has occupied the attention of the Society of late, and that is, the improvement of Cattle and Sheep for *general stock*. Of cattle and sheep, it is difficult to say which have been most the subjects of experiment in different parts of the nation, for many years past. Individuals, as was naturally to be expected, have been sometimes prematurely sanguine in favour of particular races of animals which had attracted their notice; and in favour of mixtures of different sorts, by the breeding of which they proposed to obviate some errors in size, and supposed imperfections of shape, which they concluded had been too little attended to by practical farmers; not forgetting the great object of most assiduous and speculative men, the deriving to themselves as much fame and emolument as they could, to compensate for their labour and expence. Of this description of men, the late sagacious and persevering BAKEWELL has been eminently distinguished. And perhaps never did an individual, in any age or country, do more towards

exciting general notice, or raising a spirit of greater emulation, in the department which he chose. To his memory much respect and gratitude are due, and will not fail to be paid; while those who are following his maxims of choice and improvement, either in whole or in part, and who are endeavouring to confirm his opinions, or to shew, by example, wherein they think them imperfect, will continue to render service to their country. Such men are considered with particular regard by this Society.

No subject has continued more to occupy the attention of the publick, under the head of agricultural improvements, than *an alteration in the state of Tithes*. None seems to be more the cause of dissatisfaction among the active improvers of land, country gentlemen, yeomen, and farmers, who frequent the rooms of this Society; and with whom, of course, the Secretary and the Members of its Committees have frequent intercourse. All agree in lamenting that, because the legislature originally thought proper to sanction that particular mode of subsistence for the ministers of a national church; the consequence should not only be a continued check on improvements, but a rankling animosity in the minds of farmers against the claimants, to the injury of a national worship: That the original plan, having become long since altered, by the gradual sale, gift, and lay-possession of the greater part of the tithes of the kingdom, the burden should not be suffered to remain from age to age, where every plea of clerical support is out of the question;—and where the whole fruit is evil, by the personal interest of one lay-man being opposed against that of another; while the nation, instead of the possibility of profiting at all by the contest, must be doomed to suffer, till the embarrassment shall be removed.

Under these common views of the subject, many are of opinion that an alteration in the mode of tithing, so far as concerns the clergy, might take place, on the principles of several writers in these volumes, or in other words, by a corn rent. Others have preferred, on account of greater simplicity, a pound-rate on the rent of the land; the legislature to prescribe a proper test of truth, as to the reality of the rents, to which test the claimants in all cases of suspicion may have recourse. Others have proposed that agricultural societies, and other bodies, should apply to Parliament for obtaining an act to compel the sale and purchase of all the tithes in the kingdom, on a fair valuation by a jury; and out of the produce of the appropriate tithes, the establishment of a fund, under the guarantee of government, for the more equal and comfortable subsistence of the clergy,—or (if such security be more desirable) for the purchasing of lands, the income of which to become the property of the church for ever. But the greater number seem decidedly of opinion, that, at any rate, an act for procuring the total valuation and sale of the *unappropriated* tithes (by far the greatest in amount, and supposed to be the most rigidly claimed) should be earnestly applied for, as a measure of relief to the country, and of public justice, carrying its own evidence of expedience, both from general facts, and the recent alarm of national scarcity. To these calls for the adoption of so provident a measure, has been added the political one of giving scope to population by an increase of the necessaries of life, and consequently adding strength to an insulated country, whose natural advantages have been the frequent objects of foreign envy and hostility.

The practicability of doing this, with convenience to all parties, has been, and continues to be, confidently main-

tained. The lay-proprietor receiving in money the fair value of his tithe estate, to be settled by a competent jury, impartially chosen and solemnly impaneled, cannot be said to be injured. The principle of compelling the owner of property to part with it, by such equitable valuation, for the good of the whole, stands sanctioned by numerous acts of Parliament, and is proceeded on every day, in the business of inclosures, roads, canals, publick buildings, &c. &c. And an opposition to the principle, in those matters, would be deemed a preference of personal convenience, at the positive expence of the publick good.

With regard to the owners of titheable lands; if it should be objected, that some of them might find it inconvenient to pay down the price of the tithes in fee,—*that*, it has been said, must be granted: But the great increase in the value of lands exempted from tithes, arising both from the exemption and from the probable improvements to be made, will generally furnish the means of borrowing the money, where it is wanted; and few men would think it an evil to be obliged to borrow money, even as high as at legal interest, to get rid of the incumbrance of tithes.

But, at all events, say the advocates for this measure, an act should be granted to *empower* all owners of lands paying tithes to lay-impropriators, to call a jury and settle the value, and the sale, whenever such land-owners shall be desirous so to do. A reasonable prior notice of such intention in any land-owner would of course be prescribed by law. Such open and deliberate transactions would preclude the idea of difficulty on either side; and it may be readily conceived, that the progress of such voluntary adjustments through the country, and all the consequent benefits of them, would be no tardy work. But for a more copious collection of opinions on the subject of tithes, the reader is

referred to the numerous County Surveys which have been made under the direction of the Board of Agriculture, in which this subject is abundantly treated on, by men of knowledge and reflection.

1796.

W. M.

OBSERVATIONS CONTINUED.

[By the SAME.]

THE great objects of such a Society as this are the promotion of those various improvements in the management of land, which are at once called for by a general publick duty, and by the particular *increase of population*, which is naturally to be expected in an orderly and liberal community; an increase which is now generally considered as a very important matter of fact in this kingdom.

Political calculations have varied, and may be expected to vary, about the degree of an *increasing population*, as well as respecting the *publick benefit* of an augmentation of numbers; but taking it as a fact, that an increasing call for the necessaries of human life exists, (and few will be found to doubt it) the duty of an adequate industry in using the means appointed by Providence to supply it, *i. e.* to "replenish the earth," is urgent in the same proportion. The Creator and Preserver of men has commanded it: the principles of benevolence enjoin it—and the consciousness of

an active attention will furnish, to those the most ardently concerned for promoting publick and private happiness, a sufficient reward. A continued increase, therefore, of rational endeavours to the ends in view cannot fail to extend the aggregate usefulness and honour of this society, and to add a distinguishing dignity to the highest of its members. The contributions and activity of the least considerable will be found important to the whole, and therefore every individual may find a laudable incentive to that activity which lies within his sphere. But for the aid of the most powerful example, the Society must naturally look to those members, who, from the extent of their means and possessions, have the largest scope for exertion. Such gentlemen have it abundantly in their power to give efficacy to the publick and patriotick labours of a Society, whose chief business it is to collect and diffuse knowledge. And comparatively happy will it be for this country, when many of those gentlemen shall become less solicitous to increase their quantity of landed property, than to improve, to the fullest extent, what they already have. Daily experience evinces, that a more general and strict adherence to this principle of domestick policy would be attended with advantages, national and private, which are really incalculable. To understand the mode of conduct by which they can render the most essential service to the internal prosperity of this country, it becomes necessary for such gentlemen constantly to consider, in the most close and particular manner, what are the useful improvements of which their possessions are the most capable? In other words, *how they may be rendered the most productive of human sustenance, and the most numerous instances of human comfort?*

Under this general head of enquiry, different branches of improvement present themselves for consideration:—

As, 1st. Whether the nearest lands, or those attached to the mansion, be the most advantageously divided, and applied to their most productive and proper uses?—Whether the owners occupy any wet or boggy lands, which may be rendered more valuable by easy draining, or new interfections, so as to increase, to the greatest extent, the quantity of healthy pasture for sheep and cattle?—Whether any spring, or stream of water, run to waste, which may be turned on to some part of the pastures for water-meadow? Under this idea, the great advantage of floating pasture-lands, now generally known, should be well considered, in comparison with the frequent unproductiveness of various natural pastures in dry seasons; and that though a stream may be very insignificant in itself, and make a very obscure figure through a rushy or sedgy ditch, it is sometimes possible, by erecting a dam across a particular part of the stream, to obtain a head of water, sufficient to float many acres, which would otherwise be of small use. And a ton of hay per acre increased in quantity, if not improved in quality, beside the future great improvements of the ground, are objects of present and lasting importance.—Whether, after procuring the greatest possible quantity of grass and hay, the establishment does not include some unnecessary *horses*, by which too much of that grass and hay is unprofitably consumed, instead of sustaining sheep or cattle for the *food of men*? Should this latter be the case, (which is not uncommon) the longer such horses are kept back from the *market*, the more will the habit of so keeping them operate as an improper cause of demand for *colts*, instead of *sheep and cattle*.

2dly. Whether the *distant farms* are so divided and apportioned into large and middle-sized, as to be most suitable to the general state, or gradation, of farms in the district; and especially whether a small pasture or grazing farm may

not be advantageously parted off from a large one; which, by only building a cheap farm-house, little bigger than a cottage, may make room for another useful farmer; a man, who, by close attention to that kind and degree of husbandry which can be managed with a small capital, may turn such portion of ground to an improved account, and be at the same time subservient to the greater interests of the community—in raising an additional number of young pigs, the various kinds of poultry, stocks of bees, &c.—A small orchard-plantation of half an acre, or an acre more or less, may be an useful and ornamental appendage* to all such lots of property; and if the plantation be made duly open, the greater part of the ground may also be used to advan-

* Considered in an ornamental point of view, such a plantation is highly important. An orchard *in bloom*, or ripening *with fruit*, is one of the most pleasing pictures of village scenery. The succession occupies a considerable part of the year; and the produce, in sundry ways of consumption, is truly valuable. We are prone to envy the advantages of warmer climates, in which the luxuriant growth of oranges, grapes, peaches, nectarines, &c. is almost spontaneous; but we, in many parts of our own country, neglect the cultivation of fruits congenial to our climate, and perhaps, if properly selected and improved, equally delicious or salubrious. This remark applies particularly to many parts of Wales, in which horticulture is almost abandoned. The want of fruits, and the frequent eating of salted aliments, not the most delicately cured, seem to have a visible effect on the constitutions of many of the inhabitants, which their ill-fermented malt liquors, where they can be indulged in, are but poorly adapted to correct. As the orchards become neglected, the inducement, however strange, seems to increase for the *destruction* even of very good ones, i. e. to prevent their becoming objects of *plunder*. A general exertion for new plantations becomes daily more urgent on Welsh land-owners, who regard the beauty and future profit of their domains, were the pleasure of giving a supply of cheap and pleasant fruit to their tenants, and the Welsh towns, out of the question.

tage, in raising potatoes, cabbage, &c. for the supply of the family; and any superfluous produce would always be useful, in the feeding of pigs and cattle. It has, indeed, been questioned by some gentlemen, for whose judgment the writer entertains much respect, whether an acre of orchard-ground be equally valuable, *communibus annis*, with the produce of the same ground in corn crops? But independant of the advantage of *variety*, there can be little doubt but that an acre of orchard-ground, judiciously planted so as to admit of under-cropping, especially with potatoes and cabbages, (the digging and manuring for which will improve the fruit-trees) must be more valuable than any succession of corn crops that could possibly be raised at an equal, or even superior expence. An *excessive* quantity of orcharding is not to be contended for. Leases on such small farms being far less necessary than on large or middle-sized arable ones, they may in general be considered as situations on which to prove and encourage the industry and moral excellence of an intermediate class of men, who, under a kind and fostering patronage, may be highly useful and exemplary in rural life.

3dly. Whether the larger farms be duly proportioned, and provisions in leases be wisely inserted to keep them duly proportioned, as to *pasture* and *arable*? And whether the most hilly and poor spots of the soil be suitable for, and if so, kept sufficiently cropped with, that most valuable and excellent article, *sainfoin*—which, as a cheap, easily-managed, and abundant source of food, is in many places too little cultivated, and even known? If a common objection against such careful regulations be here urged, *i. e.* that tenants will, in general, for their own interest, so occupy and crop, or depasture their land, as to turn it to the best account by meeting and supplying the greatest demand at market; we have to oppose to this general doctrine the notorious

fact, that the *indolence*, the *carelessness*, the *want of sagacity*, the *obstinacy*, and the *want of publick principle* in tenants, are too often found—more enlightened and liberal as may be the major part.

4thly. Whether the important article of *wood plantation* has been sufficiently attended to on every considerable farm? And if not, whether a speedy improvement may not be forthwith agreed on (if a farm be under lease) for a new plantation, in the most proper place or places, both with regard to shelter and ornament; particularly of the best quick-growing trees, as Scotch and other firs, the *Abele*, the *Chestnut*, the *Cedar of Lebanon*, and the *Larch*? These trees, exclusive of their beauty, will be found expeditiously valuable; and will furnish the means of constant improvement in farm and cottage buildings.* The *Asb*, the *Beech*, the *Elm*, and the *Oak*, in many places seem also to have been too little regarded, with a view to the successive interests of future generations. And it seldom happens, but some part or parts of the largest farms may be selected for a moderate plantation of these valuable trees, without any material injury, but often to the great probable advantage of the tenant, or of future tenants, in open and exposed situations.—The inattention which prevails in many parts this country to the cultivation of timber-trees, is a subject of

* Even the most common of timber-trees, (if it be properly called one) “the willow by the water-courses,” is in many instances too much neglected. That kind of wood for laths and other purposes has risen considerably in price of late years. The plantation is one of the most cheap and easy that can be conceived, and in most districts near towns, plants of moderate size will pay 7s. per head for a seven years’ growth. Now, one pound per annum for a score of willows, growing along the marshy side of a single acre, proves that more are wanted.

just regret! It is a first principle of rural œconomy, and founded in obedience and gratitude to the great Author of Nature, that men should cultivate, improve, and adorn, as well the districts they are born to inhabit, as the general state and capacities of their minds, by all the known means in their power. Local improvement, by labour and study, is a kind of inferior creation, which the Creator of the Universe seems to have appointed as the proper and most dignified employment of man. Dreariness and barrenness are the comparative deformity of Nature's works, and partly designed as the natural exemplification of an uncultivated mind. Plantation, as a provision for verdure, beauty, and usefulness, is the duty of the highest inhabitant of the soil. It is evidently conducive to universal benefit. It provides for the security and comfort of animated nature. It is one visible mean of maintaining an intellectual intercourse with the exalted Author of all life and all benediction!

To apply these mementos to our own profit, let us consider the abundant improvements that await the hand of ingenious activity in our country. Not only inclosures may be benefited by ornamental shelter for cattle, if judiciously disposed, and unfriendly blasts broken from numerous corn-fields;* but if we extend our views of improvement to many of our barren hills and down lands, the object be-

* The writer is fortified in his opinion of the vast importance of a judicious plantation of rows and clumps of trees in open countries, by the declarations of men of the first eminence in corn-farming. It having been often observed, how great the difference is in the crops between those parts where a similar noxious wind is *broken*, and where *unobstructed* in its course, in the same line of exposure. By observation, most old inhabitants and servants, on the same farm, are able to point out those parts of the fields which, on the average, suffer most from adverse winds; and consequently the best situations for planting clumps, and small groves, are easily ascertainable.

comes equally grand and encouraging. The whole is not to be considered as the work of this or the next generation; but whoever has the power of *beginning*, if but on a small scale, has the power of beginning to set an example, of which future generations will reap the advantage, and may gradually carry on, to the delight and profit of their successors.

Nothing has been more common than for men of patriotic minds to wish to transmit the advantages of *political* institutions, not only unimpaired, but improved, to posterity; this is confessedly the true spirit of patriotism. It has generally obtained the tribute of gratitude and praise. Emulation of posthumous praise is the most noble, because the least interested. Every man who judiciously plants an useful tree, fixes a living memorial of himself; the man, who, with superior ability and judgment, plants a grove, though it may at last be his lot to be forgotten, may be sure that the benefits of his existence will remain.

5thly. Whether sufficient care be taken in the leasing of farms to prefer tenants of a disposition to *neatness* in the general management of lands; to encourage such by particular commendations; and to admonish the slovenly and negligent, when they are found inattentive to their *duty*?—For a *duty* it undoubtedly is, for every tenant, independently of his general skill in the course of cropping his arable, and of stocking his pasture, to have a special regard to the *cleanness* and *neatness*, and consequently the greatest *productiveness*, of his husbandry: a duty which he owes to the community, and in the neglect of which he is a highly-culpable member of society; for though his bargain may be so easy, and his soil so good, that even under slovenly management he may be able to pay his rent, and get money, the community is suffering a constant loss by his mismanagement; and still further by his bad example, so far

forth as that example has an influence on other young inexperienced farmers.* In the present state of *population*, to which we have alluded, and for which we ought sedulously to provide; when the general complaint of *too little land being under cultivation* seems to be too well-founded, special care should be taken, by the best possible economy, to render what we have in the greatest degree productive. A slovenly farmer is one of the greatest internal enemies of his country. To a man of common discernment, the appearance of many of our lands, in particular districts, is at once mortifying and disgusting; to the benevolent and patriotick observer, it is often *afflictive*. For though the general fertility of this comparatively-happy island, under the benign influences of the Author of Nature, is such, that *famine* rarely invades, however unworthy of universal plenty, the mass of its inhabitants; yet it cannot but be known, that pining *scarcity* is the frequent portion of some, against whom no particular indolence or moral turpitude may be imputable. And this, perhaps, if we except the miserable secret chambers of crowded cities, is more frequently the case in obscure villages, and solitary huts in the country, than elsewhere; in those very abodes of poverty, which may be nearest situated to the field of the sluggard, of which we complain!—These poor people might be much relieved, in a two-fold sense, by a conduct the reverse of

* It is well known, that on a farm, where one of the publick trials of ploughs was made for the premiums of this Society, the soil was so full of couch-grass, that large roots were taken out after the ploughs several yards long. The farmer was of course bantered on his system of husbandry. He asserted the utility of couch-grass for feeding his cows—and sat all better reasoning at defiance, by asserting, that he had “proved the goodness of his farming by laying by 500l. per an. for *twenty* years past! And so, let *thickas* can do better, try”!!!

that under consideration. They want *labour*, by which to add an important trifle to their income. The slovenly farmer wants, or ought to know that he wants, an additional hand or two, or perhaps three, on his farm, to clean and scour out his ditches and drains, to remove his numerous thorns, briars, furze, docks, and thistles, which are suffered to grow, and increase unmolested from year to year, on some of the most convenient of his pastures. Such negligence always operates to the impoverishment of the soil, and to the prevention of more valuable produce in milk, butter, cheese, and butcher's-meat, than would suffice to nourish, to their hearts' content, ten times the number of those poor people whom he ought to employ. The corn-fields of such a man are often a copious mixture of grain and weeds, abundant in proportion to the natural strength of the soil—the advantage of which he stupidly counteracts; and on his miserable plan, one acre in ten—perhaps, of those under the plough, one in five—is thrown away. This latter proportion of loss, alarming as it should be, is not uncommon even in improved districts. On a comparison of the worst practice with that of the best known, the proportion of positive loss will readily be conceived to be much greater?*. The *national* scale of this grievance is next to be considered; and who, without indignation, can endure the picture?

* Few are the farms, of any considerable extent, on which it would not be good economy, and constantly profitable, to keep at least one diligent man wholly employed through the year in removing thorns, brambles, docks, and thistles; cleaning ditches, opening drains, mending fences, cutting hedges, spreading mole-hills, and the droppings of manure, &c. And should these various objects prove too few for his employment, (which is not very probable) the trimming and turning hills of compost, so as to prevent weeds from growing and shedding their seeds on such manure, will be sure to fill

In addition to the complaint of *slavely farming*, two grievances, or supposed grievances, are still frequently mentioned at these Rooms—the too common conversion of contiguous small farms into large ones, and the immoderate raising of rents; both these evils, so far as they exist, are among the effects of a proper free-agency in the owners of lands, which no friend to general liberty can wish to see extinguished. But to hasten a correction of an evil, by fair and benevolent arguments, addressed to the heart and the understanding, is a duty which men in society owe to each other, and to the cause of wisdom and truth.*

up his whole time. On large inclosed farms *two* such men may frequently be kept well employed; especially where the practice includes the raising of cabbage for feeding, and the cultivation of potatoes in orchards, on banks, and in otherwise unprofitable corners. When the advantages of such objects are placed in comparison with the wages of a man at about *twenty pounds* per annum, the argument in their favour must be obvious; independently of the pleasure arising to the farmer, from the superior neatness of his fields, and the credit he will not fail to acquire with his landlord and the publick. To *gentlemen*, who farm *their own* estates, these minute attentions will not be considered as less important: in addition to the profits directly resulting from the system, the more extensive good of *teaching by example* will have its growing influence with *them*.

* Since the first edition of this Tract was printed, it has been remarked to the author, by a *Noble* critic, who is a most able judge of men and things, that there is more danger of erroneous opinion under this head, than is commonly imagined. And on the whole it is at least doubtful, whether less injury be not done to the publick cause of improvement by improper raising of rents, than by the extreme reluctance of many gentlemen to raise at all or in any considerable degree. The first, generally speaking, excites great exertion and improvement. The latter encourages sloth, bad farming, and national loss. These remarks are undoubtedly important, and as such are here set down.

In general the rise of rents has been considered by the owners as a stimulus to industry:—in many instances it has doubtless been found so; and the experiment has answered, without a national disadvantage. In others, the too high rent, when found by experience to be insupportable, has operated as an inducement to tenants to become desperate, and under a short lease, or none at all, to draw out the virtue of the soil by immoderate cropping, and then leave it, to the consequent loss and great embarrassment of the owner; or, under long leases, to do the same thing, in order, by inducing a compromise, to get exonerated from their burden. Such natural consequences of high rents will of course operate as a check on the supposed evil; but as the nation must suffer by all the intervening damage and impediment, it is a subject which requires the closest attention.†

It is fair to conclude, that few instances of connecting small farms into large have occurred, under an apprehension

† The writer, who in these remarks alludes as well to facts which he has seen, as to those reported to him by other persons, was forcibly struck in one of his last journies in a southern county, with an instance of disadvantage to the landlord and the country, from an extensive farm being in the hands of an adventurous half-bred farmer at a high rent, or at a rent too high for the degree of improvement the farm seemed to have previously received. This man, unskilled and improvident, was beggaring the soil by random experiments on a large scale, and a most slovenly course of management. His character, as a master, so bad, that men would not work for him, if they could find employ any where else. Broken carts, wheels, and implements, were lying about under his hedges, as for ornament; and by report of his neighbours, the bailiffs were then in his house. He had a lease of a bargain he was unable to manage, perhaps just long enough to ruin himself, and half ruin the farm. Now had the same farm been divided and let, after a little improvement, to two real farmers, even for more money—or, on an encouraging lease, to one really good farmer with sufficient capital, at the same rent, how widely different would have been the prospect!

that the general produce would be lessened; and many respectable advocates for large farms are not wanting to contend, that the quantum of produce is not on the whole diminished. But the proof of the position must be allowed by its strongest advocates to be doubtful, and the practice is deservedly unpopular. Some respect will be considered as due to popular prejudice, especially in a critical period; and it is hoped by numerous persons, both of this Society and among well-wishers to the publick tranquillity in general, that gentlemen, who are primarily interested in the question, will become more disposed than they may have been, to pause upon the practice, rather than hastily extend it.

Advocate, and warmly such, as the writer of this article is, in common with numerous well-wishers to their country, for a greater proportion of small farms, he is convinced that more judgment is requisite than has often been supposed in the allotment of such farms; for if only the quantum of acres were to be attended to, such allotments, especially of arable, would be often injurious. If, for instance, due regard be not paid to the nature of the soil, but a small farm should be fixed in a very strong and tenacious one, the small farmer must be under peculiar disadvantage: for in order to plough and harrow his ground, he must keep a team equal in strength to that of a much larger farmer—to that of a man who has double, perhaps treble, his number of acres; this would be an expence wholly disproportioned to the possible profits of his farm; and supposing he paid no more rent per acre than a large farmer commonly does, would keep him in a slavish and painful penury, if he could even live. And if such a farm should be situated, as many large ones are, at a great distance from a good market-town, his disadvantage would be double, on account of the expence of carrying his produce to market, especially small ar-

ticles, as a little butter, a few fowls of different kinds, eggs, &c.—articles, by the constant furnishing of which, this kind of farmer is expected to keep down the general prices, and at the same time to get a comfortable living for himself and family. The situation most proper for such farmer would be in a light soil, easily turned with a light plough by a pair of oxen, or two cheap horses, and in the neighbourhood of a market-town, with which he could have easy intercourse for vending his productions, and for bringing back manure, of which, from the smallness of his means and the stock of cattle he keeps, he would often stand in need; for such a small farm, managed to best account, should in fact be considered and treated as a large garden. To cultivate in this manner such small farms, would be mutually advantageous to the cultivator and to the neighbouring town, by keeping the latter continually clear of unwholesome effluvia, from neglected dunghills, drains, and stagnant places. In such situations, the small arable farmer, occupying from 50 to 100 acres, if cleanly and industrious, will always be found a most respectable and useful member of society.

Small *grazing* and *dairy* farms may also be considered as most advantageously placed in similar situations. The top-dressing, to be easily procured from towns, would contribute equally to the productiveness of pasture. And perhaps it may be held as a general rule, that arable or mixed farms, if usefully *very large* at all, should be extended in size nearly in proportion to the distance from large towns and cities. Some particular circumstances, of a local nature, may furnish exceptions to this general rule; but a sound general rule is not rendered the less important by some necessary exceptions.

If the quantity of grain and butcher's meat, produced on such an altered system of division, may not be expected to

be *more* than on that of the present proportion of large farms, (which, however, must not be granted as a fact) there seems no good reason for expecting it to be *less*. Farmers are not in general found studious of turning each foot of their ground to the most profitable purpose, in proportion to the *largeness* of the quantity they hold;—they are not in general *cleanly* in that proportion;—their scale of farming is not considered as equally favourable with a small one, to the excellence of the *drill-husbandry*, by which a large proportion of seed is saved. And it is most certain, that from situation, as above pointed out, and the power of minute attention, the marketable produce, which the small drilling farmer will furnish, ought to be, for his number of acres, more in quantity than the large farmer can; and will be more various in useful articles than that farmer will think it worth his while to produce; consequently the opinion seems a fair one, that the publick would be *better* and more *variously* supplied. And while such a varied supply of the smaller articles of necessity may thus be expected from the small farmer, as eggs, fowls, butter, new cheese, small pork, a part of our veal, lamb, and small mutton, with the addition of field-peas, turnips, potatoes, &c.; we may with equal propriety look to our larger and more distant farms for our chief supply of corn, larger mutton, bacon, and beeves. Those more abundant and expensive articles are more compatible with the capitals employed on a large scale of farming, at greater distances from the publick markets, and chief places of consumption. Indeed to experience itself we may safely appeal.

Those who are acquainted with the present state of Wales, know well, that though the size of farms be considerably increased of late years, the warm attachment of the multitude to their native soil arises from their having yet abundant cause of such attachment, on account of the numerous

small convenient tenements, into which the country is divided; and in comparison of which, the merely possible improvements of condition, by *revolution* are considered, as they ought to be, but as dust in the balance. Hence, when the French landed at Filguard, the unanimity of the numerous little farmers, their wives and children, urged them in defiance to the shore, almost without a single instance of apparent disaffection; and this prominent feature of fidelity at once put an end to the invasion, nearly without bloodshed!—May this trait in the character of ancient Britons be ominous of a general and lasting disposition through the whole of an united country, possessing within itself so many natural means of happiness, and dignified independence!

If that attachment be so strong in a part of the country where superior farming, and consequently wealth from farming, are rarely known—how much stronger may we expect them to be in districts where the system of management is better, and the opportunities of advantage, by proper exertion, so much superior! The most certain and expeditious way of strengthening the government of a country, is to multiply (and this can never be too often repeated) the number of inhabitants who have personal property in its soil! The steady, sturdy example of one small industrious farmer, sanctioned in his industry by a kind landlord, will over-awe half-a-dozen dissolute journeymen and disorderly mechanicks; while a numerous peasantry, rendered happy in their cottages, connected with a little garden, orchard, and potatoe-ground, may be made their examples in sobriety and due subordination. And to such an influential picture of content and quietude, the large master-manufacturer may be beholden for much improved morality and decency among those dependent on *his* employment. For in a commercial country, where the sources of employment must fluctuate,

the best security for the quiet of the lowest ranks must be founded in habits of oeconomy and orderly living.

A radical knowledge of the true principles of general plenty, population, and content, in the country districts through the nation, will best qualify country gentlemen to act in Parliament with success; and to maintain that important dignity to which they have the most natural and proper right. Their language in the senate will assume a proportionate tone of rational authority, founded in knowledge and experience; and prove the grand counterpoise of mere acamedical and theoretic elocution. The confidence of the nation may, under such auspicious circumstances, be expected to rest, on a large scale, with such experienced men; and the happy increase of their number through the nation, would render the task infinitely more difficult than heretofore for adventurous persons, little known but in the circles of trading monopoly, and wealth, to supplant them in the important periods of Parliamentary election:—a source of danger this to the real interests of a great agricultural, as well as trading country, from which it is to be feared many disadvantages have long been felt to arise, without the means of an adequate remedy!

A principal object which has continued to engage the Society's attention, has been the important one of improving the general skill in *live stock*. This is an object confessedly of great national consequence. And it cannot but afford much pleasure, and a most favourable preface of success, to see men of the first rank and influence turning their attention from the comparatively-barren amusements of the turf and of the chace, from unprofitable horses and dogs, to those animals destined for the aid of manufactures and the food of man. Of such men this Society may boast a considerable acquisition of numbers. It is now become

a great rational question, *What race of neat cattle, sheep, and even swine, are to be considered, or by what degrees of admixture they may be made, the most profitable for a general supply of animal food?* This question proceeds on a supposition, now extensively received as a fact, that it is practicable to increase, in a considerable degree within the year, (and without materially lessening the quantity of grain for sale) the quantity of animal food heretofore produced on the same land, and that food of *better quality*; or, in other words, *more valuable*, by lessening the coarser, and increasing the finer and more profitable, parts of the animals; also by selection and admixture in breeding, to increase the disposition to speedy fattening and a speedy accretion of flesh and fat on those parts which are the most valuable for food, *by the pound weight*. The effect of these pursuits, it is evident, must be placed to the score of benevolence, in a considerable degree; inasmuch as it goes to promote the means of keeping down the price of animal food, and affording a better chance to the labouring classes of getting a little more nutritious meat, than they could be likely to do were such improvements neglected. And when the rapid progress of canals through the country is considered, by which œconomy it has been satisfactorily shewn, that a considerable lessening of the demand for horses will be made, and consequently of their consumption in corn and hay, beyond the proportion of lessened soil for the canal room; it is expected the advantage of a larger supply of animal food will be gradually felt. At any rate it is to be hoped, that by those means the increased supply of such food will be found proportionate to the degree of population, in which, as aforesaid, the country is supposed to be augmenting.

To provide for the greatest scale of numbers, and of consequent want of sustenance, is an object of necessary exer-

nion; and under that Supreme Providence which governs all things, those exertions may become powerful means of national strength and prosperity.*

The species of animals which is understood by the term *neat cattle*, is confessedly a noble and graceful ornament of our pasture-fields. The varieties arising from climate, situation, soil, and other less-known causes, are objects in themselves of curious observation and study.—The varieties, and shades of difference, are almost infinite; the difference in strength, usefulness, and beauty, are no less remarkable; and the whole of the subject affords scope for continual reflection, skill in the preference, and ingenuity in the arrangement for propagation.

It is not wonderful, that in an age of curious enquiry and experiment, men should be found devoting much of their attention to the improvement of this animal as a science. The progress, so far as it has gone, has rewarded both curiosity and cost. It must be obvious to reflection, that tho' the standard of its beauty and perfection be not easily fixible in the general opinion, there are general principles attainable, by which comparative excellence may be usefully determined; and those principles seem to be growing towards maturity. There are some particular shapes and features of the animal, which, at first view, seem to challenge a common consent, to the character of comely and beautiful. This distinction is the more speedily and fully discovered by those who, from the most constant habits of observation, are best acquainted with the hidden qualities commonly attendant on

* In the most important point of view in which these subjects can be considered, *i. e.* the *moral*, the serious observer of improving art and nature may indulge a hope, that if it be *a good* for a smaller number of inhabitants to live and be thankful for the means of comfortable sustenance, the combined object may in itself be amiable and worthy, in proportion to the extent to which it may be carried.

particular shapes and appearances; but most observers agree in soon pronouncing where beauty or deformity, symmetry or its opposite, remarkably appear.

In the variety of opinions, not yet reduced to a certain standard, it is not settled that the greatest disposition to the most profitable fattening, in neat cattle, is proportioned to what is generally considered as the most beautiful structure of the animal; particularly with regard to the mould of the body. But few will be found to doubt, that such a disposition is commonly connected with some characteristics of the general frame, (constituting what is commonly called *kindliness*;) as for instance, that the smaller and finer the head and neck, the finer and clearer the horn, the more lively the eye, the clearer and more delicate the mouth and nose, the straiter the back, the deeper the body, the smaller the bone below the knee, the thinner and looser the skin, the finer the hair, &c. the greater is the probability of expeditious and profitable fattening.

For a breeder to possess correct notions of the sources of improvement it is necessary to consider, where the most complete animals for this purpose are to be found, in a state of nature. Analogical reasoning may induce a general opinion in favour of finding those animals at home, natives of the climate, which may be most useful and profitable in that climate. The probability is, that they *will* be found there in the *most considerable* degree; although an opinion has been formed, as an exception to the general rule in some cases, and for some purposes; an opinion formed also by analogy, from the known improvement of our horses by admixture with the native races of Arabia. This advantage may be real with respect to *speed, strength in proportion to the size*, and as to *beauty*; but whether as to an increased disposition to mature and to fatten, (main points of import-

ance in the improvement of neat cattle) is not so clear. That quickness of step, and strength in proportion to size, (both important for draught) may be imparted to the ox by such admixture, is little doubted where the experiment has been fairly tried. These advantages are supposed to have been ascertained by an admixture of the lighter, smaller-boned French, Norman, and Guernsey, with some of our own. But whether this production has been superior in those respects to the unmixed natives of our own southern and south-western counties on the coast, is yet considered by some as doubtful. Others strongly maintain the affirmative; and this is no small proof of the general excellence of both. To our own counties on the coasts, and perhaps preferably to those parts of the coasts last-mentioned, we may expect to resort for our own purest and most valuable breeds. Devon and Suffex present themselves for our approbation. The general similarity is striking; but some difference, as to coarseness about the head and neck, appears against the Suffex race.

In proportion as we recede towards the centre of the nation, we discover the effects of accidental mixture, in a vast variety of colour, size, and shape; of comparative beauty and clumsiness; difficult to be described. An almost equally heterogeneous mixture may be discovered, as the produce of the interior parts of Scotland and Wales. Nor is this variety of deteriorated animals to be wondered at, when it is considered how inattentive, till of late years, have been the great majority of breeders to selection and improvement, in the propagation of neat cattle. The procuring of the number wanted in the shortest way should seem to have been the main object in view, till a more general intercourse of breeders, by means of improved roads, became favourable to comparative observation and know-

ledge. An attentive comparison of propagated deformity, with the less mixed and more beautiful droves from the clearer, warmer atmosphere of the south-western coast, could not fail to strike and suggest ideas of more careful management in the business of breeding. Thus we seem to have been indebted for new taste. From whatever local cause or causes it has arisen, the fact seems to be generally admitted in these western counties, that the county of Devon furnishes the most uniform and generally-valuable race of neat cattle for the most important uses, and particularly for the purposes of improving by mixture the stock of interior districts. Nearly similar may, perhaps, be the advantage of drawing aid from Sussex to districts nearer that county. Other kinds of admixture, for counties nearer approaching to *northern* and *eastern* shores, may possibly be deemed equally important to *them*.

The partialities of the inhabitants of different districts to those animals they are most acquainted with, and which they can most easily procure, are not unnatural; and while those partialities are connected with a growing care to select for breeding the fairest and finest individuals of the different races and mixtures; the general advantage of improvement might be going on, though with unequal success. An *uniform progress* must not be expected; and the standard of *perfection* will never be fixed. There is, however, one great scene of comparison and instruction to which breeders cannot be too attentive, for storing their minds with the principles of this sort of knowledge, and that is—the *London market*. There they will find, weekly, the most varied assemblage of shape and peculiarity, which any spot, perhaps, on the habitable globe can furnish. But if symmetry and general excellence are valuable at once to the breeder and consumer, there the inhabitants of the West of England

may discover the advantages in their own favour, which may at least serve to satisfy them, that they have no need of resorting to distant British districts for improvement of neat cattle. There the Devonshire beasts, both oxen and females, and those of a mixture from that county, will bear the test of a close comparison with all others around them. The obvious fineness of bone and offal, and large quantity of valuable flesh, in proportion to the weight of the whole animal, and in comparison with the far-greater part of the market, are conspicuous, and we may fairly presume, indisputable.

The extreme coarseness of a very large part of the beasts, sometimes brought to that vast market, may serve to convince an intelligent observer, that a wide field lies still open for improvement; however simple and obvious the principles are on which that improvement might have been long since carried to comparative perfection.

The continued zeal of the members of this Society towards the attainment of such an object gives some earnest that it *will* be attained. The publick ploughing-contests, particularly the last near Piper's-Inn, may be considered as fully proving the excellence of Devonshire oxen, and those mixed with French, for speedy and effectual labour; inasmuch, that their easy performances, on that occasion, have become discredited in other counties. And the expedition with which they fatten, after many years of profitable labour, and the superior price they will generally produce from the butcher, are undoubted proofs that the growing preference is well founded.

The French, or Norman, race, so generally heretofore prized for milkiness, gentleness, and hardness of living, will not fail to grow in esteem, for refining and bringing back to a better quality all coarse and mongrel stock, with which they shall be mixed. And the stature to which oxen

of this race will grow on *moderate*, but especially on *good*, keep,* is an answer to any objection raised against the diminutive size of the cows. But however some western gentlemen and breeding farmers may withhold their assent from the advantages hereby held out, (and some such exceptions are to be expected) one principle must be contended for, in the concurrent language of experience and skill in this Society, *That no offspring, if it can be avoided, should be raised to maturity but from the finest-boned, cleanest-headed, and best-fleshed of every stock, both male and female.* By a close adherence to this rule, the improvement that might be made, even among his own stock, by almost any breeder, in a few years would become striking, important, and influential. A close adherence to this principle of choice at home, and in occasional purchases at publick markets, will soon convince any man of common sense, how unnecessary it is for common farmers to give the enormous prices we have sometimes heard of, for chances of improvement in horned cattle!

SHEEP.

Of this animal little remains to be said, in addition to the remarks which have been already made in former pages of the Society's publications. That no particular description of sheep is likely to be pronounced by the general voice as *best for all situations*, is clear; and the fact is confirmed by progressive experience, and the soundest reason. That the *Leicestershire*, or what are called by the sheep-breeders of that county *the new Leicestershire*, sort, is growing in estimation for *inclosures* is certain. And it must be noted with pleasure, that among the improvements of these breeders

* This fact has been fully exemplified, under the care of Mr. DAVIS, in the park of the Marquis of Bath, at *Longleat*, and may be frequently confirmed by observation in *Smithfield market*.

that of *wool* is said to be increasing. If by any happy crossing and care they can carry this object considerably further, without losing any valuable peculiarity of carcase for expeditious fattening and general consumption, they will render a further very material service to their country. Whoever looks over the largest Smithfield market, will see abundant evidence of the estimation in which the new Leicestershire carcase is held; and though when fattened to the enormous degree in which it has been exhibited at Bath, the meat ceases to be a delicate article, either to the sight or taste—the new Leicestershire mutton moderately fattened, as it should be, is undoubtedly a good article for the nation. It has been a matter of frequent enquiry, What can be the motive for laying on such a quantity of fat, as the Society has been frequently treated with the sight of?—It has been as frequently said by persons enquiring for the reason, that *utility* does not appear in this matter—for such a quantity of fat cannot be eaten *fresh*, and if *salted*, such mutton is far inferior to *bacon* if not more *costly*.* The answer commonly suggested has been, that the scheme was doubtless intended to shew, to what degree of fatness such sheep were capable of being fed. This has still been unsatisfactory, because it has been readily supposed, that almost every other race of sheep may be made equally fat, on pastures and food adapted to fat them—and some in company with Leicesters. The better objects would be to shew by example, What is the degree of fatness most

* Some strong advocates for this kind of stock have doubted, or seemed to doubt, whether pig-meat can be rendered cheaper than mutton. The vast difference in the article of *fecundity* is, however, so far forth, in favour of swine; the expence of fattening, per lb. weight, is another branch of the question less easily determinable; and *wool* is an object of great collateral consequence. But considered apart from this last article, it would most likely be found, that swine of a middle size may often be rendered cheapest by the pound weight,

proper for any sheep for general consumption; and how soon, on a given kind of common food, the animal may be expected to attain that useful degree of fatness?

The South-Down race, at once for inclosures and for down-walks, are growing in repute after progressive trial. The superior quality of the wool of this latter race, added to that of the mutton, will not fail to ensure a continuance of the estimation in which they are held, in a large part of South-Britain. The increasing zeal of the Sussex farmers for improving; by selection and care, their native and invaluable breed of sheep, cannot be too much applauded.

On the topic of *selection for breeding*, admonition cannot well be too urgent. For the disadvantage arising from the neglect of it is one of the greatest in the mismanagements of a flock; and than such neglect, in common practice, nothing has been more frequent. By that kind of attention which is sometimes paid to selection, we occasionally see respectable farmers bring their flocks to great uniformity of size, and in some of the long-legged races and mixtures to a gigantic stature; as though all excellence consisted in the largeness and bold appearance of the animal, bearing a prodigious pair of horns upon a large head, and standing on legs of equal coarseness! The fleece, if regarded at all, is regarded with small attention to the fineness of the pile, and elastic quality for clothing manufacture. The reverse of this conduct would be attended with no extraordinary trouble: true critical attention might be easily paid—habit would render it familiar and delightful—the advantage in ultimate profit would be certain.

It is natural for a man to be attached to a flock of his own breeding, and a kind to which perhaps his ancestors had been accustomed; a total change is a serious thing; and such a change should never be lightly resolved on, or

without a fair comparative experiment, on a sufficient scale, against a whole race of sheep. But obstinate incredulity is the enemy of *all* improvement.

Time and observation will shew how far *district* and *local circumstances* will affect the continuance of those characteristics, which are now supposed to belong to the race of animals in question. The natural bounds (if there be such) of preservation as to *shape, size, and wool*, may ever be difficult to ascertain—and long stages of observation may elapse, from the present degree of knowledge, before the idea, now speculative, may become verified, whether any supposed peculiar race of sheep, or other useful animals, will, or will not, materially change by *continued propagation* in a new situation?—If the fact be, that original differences were naturally produced by peculiarities of various districts, it will, perhaps, not be doubted, that any considerable removal of any particular description of sheep, will be unfavourable to the perfect continuance of their characteristics. But these reflections, however well founded, may furnish no just reason against real advantages of frequent removals and trials of those races, said to be found, on the whole, the most profitable.

WOOL.

The progress of particular branches of our woollen-manufactures, and the particular state of European politics, have lately contributed to raise the price of Spanish wool to an uncommon height, proportioned to the difficulty of importation. This gradual effect has at length alarmed the fine broad-cloth manufacturers, and apparently so the *Board of Agriculture*. Much is due to the timely exertions of all publick bodies, actuated by patriotism, and moving with discretion, especially in critical times; and if their

exertions should even fail of the success they aim at, the motive is good, and will directly or indirectly produce some good effects. The public mind must on many occasions be stimulated, before it will seek expedients, or understand the power of devising them; and no effort, on the great whole, can be useless in the field of knowledge.

Any effort to supply, from native produce, the place of a foreign import, in so great an article of consumption as wool, *may* prove ineffectual; and, on our present scale of manufacture and trade, most likely will do so. It may be found impossible to supply all our looms and merchants from our own flocks, however improved—however attempted to be multiplied; but though *multiplication* cannot be pushed beyond natural bounds—*improvement* of our flocks, by that selection and admixture which have been already dwelt on, may go *far*. Just as far as it can be carried wisely, it is our duty to carry it. And though the system of driving our flocks over the hills of extensive districts, to counteract varieties of atmosphere, cannot be realized here as in Spain; we may by selection, by crossing, by coting in winter, &c. gradually add a much larger number of fine fleeces than the difference between “300,000 and 500,000”* annually. And, perhaps, much more than this may be done, with some national advantage too, as to the carcase, without materially trenching on the supply of different kinds of wool wanted for the various *other* woollen manufactures of the kingdom; the loss of *any* of which must be guarded against. But if, after all, there be found existing positive reasons why we *shall* want a foreign import of this raw material, those positive reasons need not se-

* See the speech of Lord SOMERVILLE to the Board of Agriculture, March 14, 1799.

riously alarm us. Our tried and known ability to purchase and pay, so long as that ability lasts, (and it will last as long as foreign demand for our broad-cloth) will always secure us a preference, directly or indirectly, in foreign markets. Any exception to this rule must be temporary, and will most likely be gradually rectified, when it shall occur; for even a scarcity will soon be followed by a reflux and abatement in the market, as in the cases of most other marketable articles. In the mean time there can be no doubt, but that for home consumption the quantity of English wool, so far as it can be spared for making best cloth, may be rendered sufficiently fine for all the purposes of warmth and decency. These considerations may serve to set the minds of Englishmen much at ease respecting apprehensions of any *permanent* difficulty, or advance in the price of woollen-clothing. Corn, fruits, and fat and lean animals vary in price, according to the general demand, and the quantity on the market. So also cotton, hemp, flax, silk, wool, &c. and we have small reason to apprehend, from the present state of Europe and its manufactures, that this country is in danger of suffering any material *prohibition* or *rivalship*.

These considerations are judged seasonable, by way of balance to the otherwise gloomy idea, that our power of home supply is unequal to all our demands for wool; and that it *must* be unequal seems clear, from various points of calculation. For if it be true, as has been stated, that in 1797 were imported into this country more than 30,000 packs, each about 2cwt. or 6,720,000lbs. of Spanish wool; that in a time of peace an average import of 25,000 packs, or 5,600,000lbs. may, according to former averages, be required; and that, reckoning 2½lb. to the fleece, and allowing for casualties, several millions of additional sheep and

lambs in this country would be required to supply the demand, we could not expect to augment our stock of sheep in that proportion, without changing the taste of the inhabitants very largely from other articles to mutton, as food. And could we even do that, the large decrease of the number of beeves and calves must alarmingly decrease the home supply of neat skins for *leather*; the different kinds of which have already advanced far more in price than wool has done. Nor is neat leather so little important, but that a proportionable increase of imported skins *must be had*, under all the expensive difficulties that may possibly attend it;—perhaps greater at some future time than the import of wool itself.

Respecting English wool (undoubtedly a very important article) a general complaint exists, that the growers of improved fleeces are now unable to procure from the buyers a price for fine sorts, proportionate to the improvement of quality. This discouraging circumstance operates much against improvement; and for this reason it has been suggested, that it is desirable to have convenient local depositaries for fine wool, in principal parts and places, near the clothing manufactories, to the end that a better distinction of the prices may be made and settled. Such an alteration must be gradual; but the sooner a beginning is made, the better encouragement will be secured for our home improvements of quality. In the West of England, the chief corn-market towns, and the port of Bristol, are considered as the most favourable places for the establishment of such useful marts. Wool, to those towns, may easily be sent on loads of corn, and by trading vessels.

SWINE.

Another branch of practical improvement in live stock, though not the most elegant, may be considered, in some

points of view, as little inferior to the two foregoing, i. e. *swine*. The importance of this article has long been acknowledged, by its general use in victualling the people of numerous countries, ancient and modern. What may have been the degrees of attention paid to the choice or improvement of swine in other countries, or by our ancestors in this, may be a subject not easily settled, were the enquiry of more importance. But from some causes, connected perhaps with the natural indelicacy and unpleasant effluvia of the animal, it has been less esteemed as an article of live stock, than from its importance it deserves; and, comparatively, few farmers (who are most commonly the breeders) have been known to pay much attention to its selection and improved shape. That negligence, however, has of late given place to considerable care and judgment in many of our modern improvers of stock. And never did a neglected animal promise fairer to reward such attention.

Whether we consider bacon and pork as substantial articles of food generally relished when well cured, or as articles which may most expeditiously be brought in aid of a country, in a time of scarcity, the hog is of incalculable value. The vast variety of refuse liquid, and of vegetable substances, too frequently wasted, by which this animal may be partly sustained, in numerous situations as well as in farm-yards, besides the value of its manure for gardens, orchards, and farms, are better known than regarded. And few are the country cottagers, having the benefit of a garden, or even tradesmen in towns, who have any considerable back-ground, but may constantly sustain one or more pigs, and easily bring them to a size for pork, at small expense. But much of this convenience will depend on the *kind* of swine which shall be generally propagated for sale—and something on the exposure and construction, for drairage and cleanli-

ness, of the sties in which they are kept. Proverbial as is the dirtiness of swine, perhaps few animals will better pay for a little attention in a confined state, by a constant draining away of their dung and water. These last observations, indeed, are chiefly applicable to swine of a sufficient age to be confined for pork or small bacon. For porkers, the farmer, who thinks it worth his while to cultivate this kind of stock, has particular advantages of yard-room, in which they may range at large without further confinement than convenient boundaries around his house. And the expedition with which a litter of pigs, of a natural small size, will grow almost sufficiently fat in the open air, and on the common produce of the farm-house and garden, aided by a little refuse corn, is truly encouraging.

This humble animal appears to furnish an exception to the general theory before-mentioned, *that those articles most advantageous in any climate may be expected to be found as the natives of that climate.* For however valuable our native swine may be rendered by careful selection, it is no uncommon preference which is now given, either to the genuine Chinese race, or a mixture of that race with some of the smallest and most compact of our own. Certain it is, that the Chinese race come soonest to maturity, propagate fastest, and for porkers are a very delicate and valuable article of stock. Their faculty of propagation, if closely encouraged, is extremely rapid. And their power of living and thriving on grass, clover, and other green vegetables, is most remarkable. Their diminutive size, indeed, renders them objects of only partial estimation; but this is easily corrected by admixture. And to such breeders as regard properly the utility of swine, this produce is not the least amusing among the articles of breeding-stock.

FINIS

INDEX TO THE SECOND VOLUME.

A.		PAGE
ABELE	— — —	57, 138, 142
Acorns, Observations on planting	— — —	148
Adam Mr. Observations on Ploughs	— — —	242
Alder	— — —	143, 155
Alkanet, Bastard	— — —	53
Anderfon Dr. on Cabbage and its varieties, 4; on Mangel-Wurzel, or Root of Scarcity, 31; had not the true sort	— — —	36
Anonymous, on Turnip-rooted Cabbage, 5; on Carrots, 21; on Parsnips, 27; on the Roota-Baga, 28; on Rape, 41; on Hemp and Flax, 42; on Madder, 47; on Rhubarb, 62; on Soaper's-Ashes, 75; use of Stagnant Water, &c. 76; on Ashes, 76; on Lime, 77; on worn-out Land, 78; on raising Elms, 131; on planting some kinds of Land, 132; on planting Poplars, Abeles, Ash, and Oaks, 138; on Waste-Lands, 185, utility of Benefit Societies, 227; on offering a Premium for a Machine to raise Water, 229; method of making Ponds, 260; method and great advantage of extracting the Essence of Oak-Bark for Tanning	— — —	261
Apples, Apple-Trees, &c. 170; various kinds, 174; planting, grafting, &c.	— — —	176
Arbuthnot Mr. cultivated Madder with success	— — —	48
Ash-Trees	— — —	132, 138, 143, 167
Ash-Poles	— — —	153
Ashes for Manure	— — —	76
Ashman Mr. J. description of a Comb-Pot	— — —	237
Axford Mr. noxious Vegetables in Meadows and Pasture Lands	— — —	53
B.		
Barberry	— — —	55
Barley	— — —	70
Barn, Plan of	— — —	234
Bartholomew Mr. description of a Patent Plough	— — —	256
Bartley Mr. on Buck-Wheat	— — —	3
Bath Marquis of, account of the progressive Improvement, in weight and value, of a Flock of Sheep	— — —	282

	PAGE
Beans, Culture of	1, 2
Bedford Mr. on the use of Malt-dust as Manure	85
Beech-Tree	55, 143
Bees, Observations on	71
Beevor Sir Thomas, on Turnip-rooted Cabbage, 5; on the Mowing Cabbage, 9; on the Roota-Baga, 27; on Mangel-Wurzel, 30; on accuracy in the characteristic Distinctions of Plants, &c. 68; on a new Oil Manure, 75; on the comparative Duration of several kinds of English Wood, 134; on the growth and improvement of Oak Timber, 149; on the Drill-Roller, 246; account of the Bridewell at Wymondham in Norfolk	269
Benefit Societies, utility of	227
Bentley Oak, size of	129
Berchtold Dr. on the Hydrophobia	124
Bernard, James esq; on Mangel-Wurzel	33
Billingley J. esq; on Carrots	19
Bindweed	53
Birch	155
B. K. on Manures	73
Borage	53
Bromwich Rev. Mr. on Mangel-Wurzel	32
Broom Grass	58
Broughton Rev. Mr. on the Turnip Cabbage	8
Buckthorn	55
Buck-Wheat, Observations on	3, 4, 71
Burnet	54
Bush-Vetch, on the Culture of	49
Butterworth, the plant	53

C.

Cabbage, and its varieties, Culture of, 4 to 18; Red and White, 4; when to be Sown, 70; Crop, Weight of	18
——, Mowing	9
——, Turnip	8
——, Turnip-rooted, 5; quantity of consumed by Cattle and Sheep, 5; food for Cattle, 6; for Pigs, 7; compared with Turnips, 9, 10; great utility of, 12, 13; cultivation, 15; will resist the severest frost, 69; attended with great trouble and expence to get the Roots out of the ground, 69; should be used the last of all green food	69
Call Sir John, on Population	207
Canvas, method of preparing	259
Carrots, crops of, produce, 19, 20, &c. cultivation	21
Chemistry, application of to Agriculture, &c.	265
Chickweed	57
Cider, Observations on, 178, 180, 181; enormous quantity drank at one sitting	182
Clifford Mr. on Maple Sugar	183
Cloke Rev. Mr. on the Culture of Beans, 2; on Swedish Turnips, 49; Table for Manuring Land	—

INDEX TO THE SECOND VOLUME.

iii

	PAGE
Cock-Chaffer, account of	94
Comb-Pot, to burn Pit-Coal, described	237
Cooke's Drilling-Machine	231
Corn-Rake, Description of	228
Cottages, Plans of	249
Couch-Grafs	54
Cow-Parfnip	55
Cows, Spondylium	55
Crocker Mr. on different Plants, 53; on Apples	174
Croley Mr. Method to kill Slugs	97

D.

Davis Mr. Observations on Timber; imagines the growth of English Oak equal to the want, 149; on Woods and Underwood, 154; on Tithes, 200; Plans of Cottages	219
Dean, Forest of, thoughts on, 135; neglect of	159, 160
Distinctions of Plants, necessity of accuracy in	68
Dobson Mr. Plan of a Barn	234
Dorsetshire County-Gaol, account of	273
Draining, Observations on	192
Drill-Machines, Reflexions on	242
Drill-Roller	246
Duration of several sorts of Wood	134
Dwale, or Deadly Night-Shade	55

E.

E. C. on Enclosures	153
Elder	56, 70
Ellerken Mr. on Flax	47
Elms, Method of raising, 131; Timber profitable	152

F.

Fairlop Oak, size of	129
Falconer Dr. on Rhubarb, 62; on the Health of Persons employed in Agriculture	110
Feltham Mr. on sundry Topics	69
Flax, Culture of 42, 43; Preparation of	43
Fletcher Mr. on planting Forest Trees	132
Flote Fescue	53
Fothergill Dr. J. on Rhubarb	64
Fothergill Dr. A. (Bath) on Rhubarb, 66; on the Poison of Lead, Copper, and Brass, 102; on Spirituous Liquors, 205; on the Hydrophobia, 125; on Cider, 181; on the application of Chemistry to Agriculture and Rural Economy	263
Franklen Mr. on Mangel-Wurzel	36
Furber Mr. on a Worm which destroys the Wheat Plants	98
Furrow-Roller and New Drag, account of	258
Fyfield Oak, size of	144

G.		PAGE
Gentlemen of Pennsylvania on Plaster of Paris	—	19
Gillingwater Mr. on Apples and Apple-Trees	—	171
G. L. on Waste Land	—	185
Glauber's Salt, account of	—	263
Goofe-Grass	—	54
G. P. on Rhubarb	—	59
Grieve Dr. on Russian Implements of Husbandry	—	235
Griffith Mr. on mixing Lime with Gunpowder	—	259
Grimwood Mr. on Apples and Apple-Trees	—	171
Gromwell	—	54
Ground-Ivy	—	57
Gullet Mr. on Insects infecting Apple-Trees	—	101
Gyptium, see Plaster of Paris.		

H.		
Harrow and Drag, new description of	—	241, 257
Haskins Mr. on Insects	—	98
Hawthorn-Tree, large, near Hethel church	—	129
Hayes Mr. on Rhubarb, 67; on the Poison of Copper-Vessels	—	105
Hazard Mr. on Parsnips, 25; on the Culture of Rape	—	39
Hazel	—	153
Heath	—	56
Hedges may be made more profitable, 70; to improve	—	133
Hemp, Culture of	—	42
Hints on Sowing	—	70
Hobhoufe B. esq; on the difficulties of Enclosing	—	192
Holly	—	54
Horn Mr. Drill-Machine	—	231
Hydrophobia	—	124, 125, 127

I, J.		
Insects, Observation on	—	96, 97, 98, 99, 100
Joyce Mr. Experiments on Wool	—	266
J. S. on Rhubarb	—	67
Ivy	—	55

K.		
Keys Mr. on Bees	—	71
Kirby Mr. on Manures	—	24
Kirkpatrick Mr. Implement for transplanting Turnips	—	236

L.		
Ladies'-Bedstraw, yellow	—	54
Land, for planting	—	132-3
Lanidown Mr. Method of preparing Canvas	—	259
Larch Timber	—	151
Larkspur	—	57

INDEX TO THE SECOND VOLUME.

v

	PAGE
Lead, how to discover in Liquor	102
Leith Cart described	245
Lettfom Dr. on Rhubarb	61
Lime, as Manure, 77; used with Gunpowder	258
Lime-Tree	57
Lover of Georgical Pursuits on Parsnips	27

M.

Machine for raising Water	229
Machines and Implements of Husbandry	228
Madder, Culture of	47
Madness	55
Malt-Dust as a Manure	85
Mangel-Wurzel, Culture of, 30; relished by Cattle, 31; good food for Pigs, 32, 35; for Cows, 33; Crop, weight of, 33; makes sweet Cream and Butter	36
Manures	74
Maple Sugar	183
Marshall Mr. on the Growth of Trees	129
Martin Sir Mordaunt, on Mangel-Wurzel, 36; on the Poor-Rates	217
Matthews Mr. on the Poor, 209; Observations on the Agriculture Papers	285
Meynell Mr. on the Hydrophobia	127
Milk Thistle	56
M. N. on destroying Rats	96
Morse Mr. on various kinds of Apples, 174; on Planting, Grafting, &c.	176
Mounsey Dr. on Rhubarb	59
Murrel Mr. H. Washing-Machine	246
Mustard, on the Culture of	48

N.

Norfolk Plough	230
----------------	-----

O.

Oak, on transplanting, 138; at Dibden	169
Oak Bark, method and advantage of extracting the Essence of, for Tanning	261
Oats	70
Olney Rev. Mr. on Carrots, 25; on Mustard	48
Outlines of a Scheme to alleviate the unequal Burthen of the Poor-Rates	217

P.

Paint for Pales, Doors, &c.	263
Parry Dr. on the Culture of Cabbage	18
Parsnips, Culture of	25
Pavier Mr. produce of Pease, 2; on Manure, 74; on the Forest of Dean	135
Pease	70
Pellets for Rats	95

	PAGE
Pelletory	57
Pew Mr. on constructing Reservoirs for preserving the Li- quor of Stables, &c. 92; on Provident Societies	210
Pinchard Mr. account of a Furrow-Roller	258
Pipperidge Shrub	56
Pitt W. M. esq; on the Gaol at Dorchester	273
Plants, properties of	53
—, noxious, found in Meadows and Pasture Land	53
Plantations	137
Plaster of Paris, used as Manure	89, 92
Plough for Under-draining	256
Ploughs, Observations on	244
Poison of Lead, Copper, and Brass	102
Ponds, Method of Making	260
Poole Mr. on Rhubarb	68
Poor, on the providing for	209
Poor Laws, on the Improvement of	216
Poplar-Tree	57, 138
Population, enquiries concerning	207
Potatoes	71
Preservation of the Health of Persons employed in Agriculture	110
Provident Societies	210
Pryce Mr. on Timber	151, 196, 205

Q.

Queries proposed by an Economical Committee of Parlia- mentary Gentlemen, &c. answered by Mr. Matthews	215
---	-----

R.

Rack Mr. on the Cock-Chafer, 94; on planting Ash	167
Rape, Culture of, 37, 39; food for Sheep	40
Rawson Mr. on Rape	37
R. D. on Rhubarb	59
Reservoirs to preserve Stable-Liquor, &c.	92
Rheum Palmatum, the true Rhubarb	61, 64, 65
Rhodes Henrietta, on Silk-Worms	92
Rhubarb, Culture and Observations on	59, 61, 62, 66, 67, 68
River-Weeds as Manure, Experiments on	91
Roota-Baga, Account and Culture of, 27; will not bear se- vere Frost	69
Roses, wild	56
Russian Implements of Tillage	235

S.

Saccharine quality of the Juice of Pears	173
Samuel Mr. R. on Apples and Apple-Trees	170
Sanders Mr. on Destroying Insects	—
Sandilands Hon. Mr. Description of an Instrument called a Sward-Cutter	247

INDEX TO THE SECOND VOLUME.

vii

	PAGE
Sargent Mr. on Beans	1
Scotch Fir	57
Sheep's Fescue	53
Silkworms, Management of	92
Slugs, to kill	97
South Mr. on Timber	139, 163
Spirituous Liquors, bad Effects of	106
Spring Feed for Sheep	12
Spring Vetches	70
Squirrels, mischievous	97
Stephens R. esq; on Cider	180
Sward-Cutter described	247
Swayne Rev. Mr. on the Bush-Vetch, 49; account of a Species of Glauber Salt	263

T.

Table for Manuring Land, 84; of Equation of Stock	184
Tanning Leather without Oak-Bark	268
Timber, growth of various Sorts, 129; enough in the County of Hants to supply Portsmouth-yard, 150; and in the other maritime Counties to furnish other Dock-yards, 150; Oak, use of, lessens every day, 150; object of great importance, 160; Stock of the Country low, 146; actual Diminution of, 163; whether the quantity has diminished or not, 160; neglect in Cultivation	160
Tithes, Observations on, 193; Compositions	196
Tortworth Chestnut, size of	130
Trees, &c. 29; some of large dimensions	129
Treffrey Mr. on the new Harrow and Drag	241
T. S. on Manures	72
Tugwell Mr. on Turnip-rooted Cabbage, 10; Plan of a Pedometer	251
Turnips	71
——, Swedish, see Roota-Baga.	

U.

Underwoods	152
------------	-----

V.

Vermin	94
Vagg Mr. on the Culture of Cabbages	7
Ventilators for preserving Corn, Plan of	253

W.

Wagstaff's Hints for Sowing, 71; on River-Weeds, 85, 6, 8; on Hedges, 133; on Planting, 137; on the Culture of Apple-Trees	172
Ward Mr. on the growth of Oak	152
Washing-Machine	246
Wastes, Heaths, &c.	185, 186, 192
Webb Mr. Measurement of Oaks at Dibden	169
W. F. on Tithes and Enclosures	
Wheat-Sowing	71

	PAGE
White Mr. Method of Tanning without Oak-Bark	268
Willow	155
Wimpey Mr. on Mangel-Wurzel, 34; on the State of Timber, 160; on Drill-Machines	242
Winlaw's Patent Mill	235
Winter's Drill-Machine	238
Woods, to recover when decayed, 156; State of, in the Western Counties	158
Wool, Experiments on	266
Worm, a particular kind, which destroys the Plants of Wheat	98
W. T. Paint for Pales, &c.	263

Y.

Young A. esq; on the Culture of Carrots, 21, 23; method of Managing his Manure	79
--	----

DIRECTIONS TO THE BINDER FOR THE PLATES AND
TABLES TO VOL. II.

Reservoir for a Farm-Yard	92
Oak-Trees, plate 1, 2, 3	146
, plate 4, 5, and 6	147
Plate, to explain the improved method of Heeling	166
Norfolk Plough	front 230
Cooke's Drill-Machine	231
Horn's Drill-Machine	232
Plans of Cottages	221, 2, 3, 4, 5, 6
Barn	234
Winlaw's Patent Mill	236
Comb-Por	238
Winter's Drill-Machine	239
Treffrey's Harrow and Drag	242
Drill-Roller, Drill-Plough, and Washing-Machine	246
Sward-Cutter	247
Harrows, Drags, Drain-Plough, &c. two plates	256
Improved Pedometer	251
Table of progressive Improvements	283



